

Volume 38 · Part 4 · April 1959

---

# REVIEW OF APPLIED MYCOLOGY

COMPILED FROM WORLD LITERATURE ON  
PLANT PATHOLOGY AND APPLIED MYCOLOGY



## RECENT PUBLICATIONS

### TOBACCO DISEASES

With special reference to Africa

By J. C. F. HOPKINS. 204 pp., 54  $\frac{1}{2}$ -tone plates, 5 col. plates, 1956

Price £1. 15s. post free

### CLUB ROOT DISEASE OF CRUCIFERS CAUSED BY PLASMO- DIOPHORA BRASSICAE WORON

By JOHN COLHOUN. 108 pp., 4 fig., 1958

Price 20s. post free

### AN ANNOTATED LIST OF SEED-BORNE DISEASES

By MARY NOBLE, J. DE TEMPE, & P. NEERGAARD. 163 pp. and Index

Price 20s.

---

COMMONWEALTH MYCOLOGICAL INSTITUTE  
KEW · SURREY

Price 6s. net

# COMMONWEALTH MYCOLOGICAL INSTITUTE

EXECUTIVE COUNCIL: J. G. MALLOCH, M.B.E., PH.D. (*Chairman*), Canada; A. PERERA (*Vice-Chairman*), Ceylon; W. G. ALEXANDER, C.B.E., United Kingdom; E. J. DRAKE, Australia; V. ARMSTRONG, PH.D., New Zealand; J. F. BROOKS (*Acting*), Union of South Africa; S. KRISHNAMURTI, India; C. K. REHEEM, Pakistan; J. E. SAGOE, Ghana; J. D. DE SILVA, Federation of Malaya; J. E. C. COVENTRY, Federation of Rhodesia and Nyasaland; C. E. LAMBERT, C.M.G., Colonial Territories.

*Secretary:* Sir HERBERT HOWARD.

STAFF: *Director and Editor:* J. C. F. HOPKINS, D.S.C., A.I.C.T.A.; *Assistant Director:* H. A. DADE, A.R.C.S. *Mycologist:* E. W. MASON, O.B.E., M.A., M.SC. *Assistant Editors:* G. C. AINSWORTH, PH.D.; GRACE M. WATERHOUSE, M.SC. *Assistant Mycologists:* C. BOOTH, M.SC.; F. C. DEIGHTON, O.B.E., M.A.; M. B. ELLIS, PH.D.; J. J. ELPHICK, B.SC.; *Bacteriologist:* A. C. HAYWARD, PH.D. *Sub-Editors:* E. B. MARTYN, B.A., A.I.C.T.A.; D. JEAN STAMPS, PH.D. *Colonial Pool of Plant Pathologists:* R. A. ALTSON, B.SC., A.R.C.S.; P. HOLLIDAY, M.A.; B. E. J. WHEELER, PH.D.

## SULPHATE OF COPPER

98/100% PURITY

### CRYSTALS AND POWDER

#### FUNGUS DISEASES

Control and prevent by spraying with Bordeaux Mixture made with the best quality Sulphate of Copper.

#### COPPER DEFICIENCY

Sulphate of Copper in powder form is also widely used for the correction of Copper Deficiency of the soil and in animal nutrition.

### BRITISH SULPHATE OF COPPER ASSOCIATION LTD.

1 GREAT CUMBERLAND PLACE, LONDON, W.1

*Telegrams:*

BRITSULCOOP, WESPHONE, LONDON

*Telephone:*

PADDINGTON 5068/9

### OTHER COMMONWEALTH AGRICULTURAL BUREAUX JOURNALS OF INTEREST TO PLANT PATHOLOGISTS

The literature on agricultural insect pests is abstracted in the *Review of Applied Entomology*, Series A, and that on plant pathogenic nematodes in *Helminthological Abstracts*. Additional references to deficiency diseases will be found in *Soils & Fertilizers*, to plant breeding in relation to disease in *Plant Breeding Abstracts*, and to forestry problems in *Forestry Abstracts*. All these journals except the first are obtainable from Central Sales Dept, Farnham House, Farnham Royal, Bucks. The *Review of Applied Entomology* is sold by the Commonwealth Institute of Entomology, 56 Queen's Gate, London, S.W. 7.

C. A. S.

27 APR 1959 April 1959

FILE

IMLE (E. P.) & SHRUM (J. E.). Quarantine isolation centre for Cacao in Florida.—*Cacao (Int.-Amer. Cacao Cent.)*, 3, 14, pp. 1-5, 1958.

This shortened version in English of a paper which appeared in Spanish in *Turrialba*, 8, 1, 1958, reports that 91 clones are now established at the U.S. Plant Introduction Station, Coconut Grove, Florida. The methods in use at the Station are outlined, including precautions taken to exclude *Marasmius perniciosus* and cacao viruses, and the recommendations given to shippers of cacao material.

VENNING (F. D.) & GERTSCH (M. E.). Field trials of low volume high-concentration fungicides in oil and water in Cuban Cacao plantings.—*Cacao (Int.-Amer. Cacao Cent.)*, 3, 14, pp. 6-7, 1958.

In trials at the Finca 'Buena Vista', Baracoa, Oriente, Cuba, to determine the field practicability of low-volume spraying of cacao on steep ground, none of the fungicides tested (manzate, zerlate, thylate) gave sufficient control of heavy infection by *Colletotrichum theobromicola* and *Phytophthora palmivora* on 50-yr.-old trees in poor condition, though manzate is considered to warrant further trial. Their failure is attributable to their rapid decomposition after spraying. Applied in oil with a swingfog machine they depressed yield, probably because the oil interfered with fruit set. Knapsack mistblowers [37, p. 636], applying aqueous mixtures, appeared to be more suitable.

FARRAR (L. L.) & STACY (S. V.). Diseases of small grains observed in Georgia during the 1957-58 season.—*Plant Dis. Repr.*, 42, 11, pp. 1262-1267, 6 fig., 1958.

Oat mosaic virus [37, p. 30] was observed for the first time at Calhoun, on Sure-grain, and was also seen on Victorgrain in Spalding county. Black point (*Helminthosporium sativum*) [*Cochliobolus sativus*] was present at several locations; in one field of Bledsoe wheat only 16.3% of the kernels bore symptoms but 96.6% produced spores of the pathogen after 72 hr. in a moist chamber. Slurry treatment with panogen 15 (diluted in water 1:5; 15-22 ml/8 lb. seed) effectively controlled this seed infection. At Georgia Experiment Station the barley vars. Wong, Hudson, Colonial, Tex. 10-47-136, and Harbine showed little or no infection by *Rhynchosporium secalis* [see below], *Ustilago nuda*, or *H. gramineum*, though some other vars. developed up to 65, 15, and 15%, respectively.

ROANE (C. W.) & STARLING (T. M.). Miscellaneous notes on small grain diseases in Virginia.—*Plant Dis. Repr.*, 42, 11, pp. 1268-1271, 1958.

Observations by the Virginia Agricultural Experiment Station, Blacksburg, during 1957-8, showed that the ubiquitous barley var. Wong is very susceptible to scald (*Rhynchosporium secalis*) [cf. 37, p. 715 and above], which has recently become the most damaging barley disease in the State. Hudson, though resistant, is not popular with farmers. At the Station rye adjacent to barley also became infected, a new State host record. *Helminthosporium* [*Pyrenophora*] *teres* and *Cochliobolus sativus* were also widely prevalent on barley, the former the most destructive. Sharp eye spot (*Rhizoctonia* [*Corticium*] *solani* [cf. 36, p. 396]), widespread in barley in 1958, is another new record for Virginia. Leaf rust (*Puccinia recondita*) [*P. triticea*] was the most serious disease on wheat.

КОЗНЕВНИКОВ (S.). Головные болезни Красноярском крае. [Smut diseases in the Krasnoyarsk region].—С.-х. Сибири [*Sel.-khoz. Siberia*], 1957, 12, pp. 46-48, 1957. [Abs. in *Referat. Zh. Biol.*, 1958, 14, p. 209, 1958.]

Investigations during 1945-56 showed that the damage done yearly to spring

wheat by [*Ustilago tritici*: **35**, p. 598] is 1.58%, to oats by [*U. avenae*: **34**, p. 145] 0.49%, to barley by [*U. nuda*: **37**, p. 275] 0.22%, to millet [*Panicum miliaceum*] by [*Sphacelotheca destruens*: **37**, p. 534] 1%, and winter rye by [*U. vavilovi*: **36**, p. 189] 0.51%. Further south infection is negligible.

ZOGG (H.). **Fußkrankheiten des Getreides.** [Foot rots of cereals.]-*Mitt. schweiz. Landw.*, **6**, 8, pp. 113-119, 2 fig., 1958.

Suitable crop rotation is the recommendation of the Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich-Oerlikon, Switzerland, for control of foot rots of cereals [**36**, p. 641] caused by *Ophiobolus graminis*, *Cercospora herpotrichoides*, and other fungi, to which wheat is particularly susceptible. The effect of different stubble crops was tested after harvesting winter wheat by sowing the heavily infested ground with various forage crops and then ploughing them in at the end of Nov. Wheat was sown the following spring. Wheat or barley following legumes were much more severely attacked than after an autumn fallow or where non-susceptible cereals (oats) or grasses (together with legumes) were sown. The wheat yields (kg./are) were: after autumn fallow 10.5, wheat+crimson clover 4.2, barley+spring vetch 4.2, oats+spring vetch 8.9, Italian rye grass [*Lolium multiflorum*] +crimson clover 11.2, and rape 9.6.

POPOW (G.). **Kärntner früher Sommerweizen, eine neue Sorte im schweizerischen Richtsortiment.** [Kärntner early summer Wheat, a new variety in the Swiss official list.]-*Mitt. schweiz. Landw.*, **6**, 5, pp. 77-80, 2 fig., 1958.

This var., provisionally recommended in Jan. 1958 for marginal land but not for the plains, is not susceptible to brown rust [*Puccinia triticina*], practically not to black rust [*P. graminis*], and only very slightly to yellow rust [*P. glumarum*].

SAMBORSKI (D. J.), FORSYTH (F. R.), & PERSON (C.). **Metabolic changes in detached Wheat leaves floated on benzimidazole and the effect of these changes on rust reaction.**

FORSYTH (F. R.) & SAMBORSKI (D. J.). **The effect of various methods of breaking resistance on stem rust reaction and content of soluble carbohydrate and nitrogen in Wheat leaves.**-*Canad. J. Bot.*, **36**, 5, pp. 591-601, 4 graphs; pp. 717-723, 8 graphs, 1958. [23 and 22 ref.]

In further experiments at the Canada Dept Agric., Winnipeg, Manitoba [**37**, p. 224], in which detached leaves of resistant Khapli and susceptible Little Club inoculated with race 15B of *Puccinia graminis* were floated on water or benzimidazole (40 p.p.m.) with or without glucose, Khapli became susceptible on water, remained resistant on 40 p.p.m. benzimidazole, but became susceptible on addition of 1% glucose, though resistant on 60 p.p.m. benzimidazole. Little Club remained susceptible in all treatments. Increasing the endogenous substrate levels by floating the leaves on water for 2-4 days or spraying with DDT [cf. **37**, p. 529] 2-3 days prior to detachment resulted in increased susceptibility of Khapli in 40 p.p.m. benzimidazole but resistance or partial resistance at higher concs.

Transfer to benzimidazole interrupted the decrease in protein progressing in the detached leaves in water, and some resynthesis occurred, with a decrease in the soluble N, which was present in greater quantity in the presence of 1% glucose. Alcohol-soluble carbohydrate increased in leaves on water in contrast to those on benzimidazole.

In the second paper the authors report that applying 100 p.p.m. maleic hydrazide [cf. **37**, p. 224] daily to soil 6 days before inoculation, spraying the 1st leaves with 640 p.p.m. DDT, detaching them, and searing the leaf bases with a hot spatula produced a breakdown in the resistance of Khapli to *P. graminis*. The DDT and

searing treatments were accompanied by a big increase in the carbohydrate and soluble N levels, maleic hydrazide by somewhat less. Var. McMurachy, resistant at 65° F. and susceptible at 75°, showed no difference in carbohydrate level and but little in soluble N at the 2 temps.; insoluble N decreased faster in leaves at 75° and remained fairly constant with the maleic hydrazide treatment. The data obtained emphasize the importance of substrate availability in rust development, but do not indicate whether any individual constituent of the substrate is of particular significance.

GARRETT (W. N.), FUTRELL (M. C.), & ATKINS (I. M.). **Effects of stem rust of different infection intensities on yield and other factors in Wheat.**—*Plant Dis. Rept.*, **42**, 11, pp. 1237–1243, 4 graphs, 1958.

In the 2nd season (1957–8) of these investigations at College Station, Texas [cf. **37**, p. 653], Bowie Wheat, very susceptible to race 29 of *Puccinia graminis* and resistant to 15B, and Lee, moderately susceptible to 15B and resistant to 29, were grown in plots and inoculated with races 29 and 15B, respectively [cf. **37**, p. 766], at 2, 4, or 6 ft. intervals (equivalent to 7,260, 2,420, and 303 centres/acre). Other plots, not inoculated, were sprayed with maneb (6 lb./30 gal./acre) weekly for 9 weeks. Conditions were more favourable for wheat growth than in 1956–7 and rust spread was slower. Yields of Bowie and Lee, respectively, in order of decreasing inoculum, were 18.2 and 32.3, 27.1 and 33, and 27.3 and 34.8 bush./acre, compared with 57.3 and 61.3 in the sprayed plots, and about 27 and 37 in the unsprayed, uninoculated. It is apparent that fungicidal control of wheat rust, contrary to general belief, might prove an economic proposition.

ATKINSON (T. G.) & ALLEN (P. J.). **Germination of Wheat stem rust spores en masse.**—Abs. in *Plant Physiol.*, **33** (Suppl.), p. ix, 1958.

It is reported from the University of Wisconsin, Madison, that ethanolic extracts of non-absorbent cotton contain substances which induce the rapid mass germination of wheat stem rust [*Puccinia graminis*] spores [**37**, p. 274]. From the behaviour on ion-exchange resins, a compound possessing the major fraction of this activity appears to be a non-ionic substance containing (on the basis of its infra-red spectrum) a keto- and a preponderance of methylene groups. Its ultra-violet spectrum exhibits a major absorption peak at 285 m $\mu$ .

The results of initial studies on spores induced to germinate by means of this compound indicated that their O uptake is maintained at a level 2–4 times that of the ungerminated. However, at least during the 1st 4 hr., the amounts of glucose they take up do not greatly differ from the considerable quantities absorbed by ungerminated spores.

ORJUELA-NAVARRETE (J.). **Variability in reaction of Wheats to isolates of races 38 and 48 of *Puccinia graminis* var. *tritici*.**—*Diss. Abstr.*, **18**, 3, p. 770, 1958.

At the University of Wisconsin the wheat vars. Marquis, Reliance, and Kota [**34**, p. 142], hitherto used for characterizing races 38 [**34**, p. 219] and 48 [**36**, p. 687] of *P. graminis* f. sp. *tritici*, have not been very reliable with isolates of these races from the United States and from Central and S. America. Kota is erratic and Marquis varies over a wide range of temp. and light. Reliance is reliable for differentiating these races, but does not clarify the position of race 48B, to which it is slightly susceptible. On Kanred, now replaced by Reliance, race 48B closely resembles 38, and differs markedly from 48, to which Kanred is highly resistant. Rescue is highly resistant to race 48, susceptible to 38 (over 66–87° F.), and is moderately resistant to 48B. Thatcher and Newthatch (on which 48B resembles 48 more than 38) are approximately as reliable as Rescue in separating the 2 groups, though the reaction of Newthatch varies somewhat with different isolates

and is temp. sensitive. Timo/stein [36, p. 640] is immune from 48B and susceptible to other isolates. Frontana is useful for separating subraces within 38 and 48 while Bola Picota, McMurachy, Cadet, Bockveld, and E.W. 47-7227 are of value in specific environments and for subraces of 48.

**BASILE (RITA). A new physiological race of *Puccinia graminis tritici* of low virulence on all varieties of the differential series.**—*Robigo*, 1958, 6, pp. 1-3, 1958. [Italian and Spanish translations.]

While identifying the 1955 physiologic races of *P. graminis* f.sp. *tritici* [cf. 36, p. 529 *et passim*] at the Stazione di Patologia Vegetale, Rome, a new race, designated 294, was isolated from a non-identified wheat in the Florence district. All differential wheat vars. were highly resistant to it, though Mentana proved very susceptible. Race 294 is less virulent than 189, isolated in Italy in 1957.

**SANTIAGO (J. C.). Geographical distribution and prevalence of the physiologic races of *Puccinia graminis tritici* determined in Portugal from 1951 to 1958.**—*Robigo*, 1958, 6, pp. 7-9, 1958. [Portuguese and Spanish translations.]

It is reported from the Estacao de Melhoramento de Plantas, Elvas, Portugal [cf. 36, p. 521], that race 21 of *P. graminis*, followed by 186 and 17, has been the most prevalent on wheat in Portugal since 1951. Annual losses, however, have been reduced latterly by the use of the early Portuguese vars. Pirana, Lusitano, Resteracao, and the Italian vars. Roma, Impeto, and Autonomia.

**MOHAMED (H. A.) & EL-SEIFY (M.). Wheat rusts in the Egyptian region of the United Arab Republic.**—*Robigo*, 1958, 6, pp. 9-12, 1958. [Spanish translation.]

*Puccinia graminis*, formerly the most serious in Egypt [see below], is now countered by resistant vars.; *P. rubigo-vera* [*P. triticea*] has recently become more important; *P. glumarum* is generally of minor importance. The Bahtim Experimental Station uses *Triticum timopheevi* and some Kenya vars., including Kenya Farmer (Kenya 338 AC), as sources of resistance, and also Newthatch and Lee and the local hybrid Hindi 62 × Hindi 722.

**ABDEL-HAK (T.). Physiologic races of *Puccinia graminis tritici* in the United Arab Republic.**—*Robigo*, 1958, 6, pp. 12-13, 1958. [Spanish translation.]

From the Ministry of Agriculture, Giza, Osman, Egypt, it is reported that the predominant races in Egypt [see above] are 17, 19, 21, 14, and 24. The 1st 3 also head the list for Syria.

**ABDEL-HAK (T.). Physiologic races of Wheat stem rust in the Near East.**—*Robigo*, 1958, 6, pp. 14-15, 1958. [Spanish translation.]

Tabulated results of the examination of collections made during 1949-57 show the most prevalent races of *Puccinia graminis* in countries of the Near East to have been: in Egypt, Cyprus, Iraq, and Pakistan, 17 [see above]; Syria and Turkey, 11; Jordan, 14; and Iran, 15.

**JOHNSON (T.). Regional distribution of genes for rust resistance.**—*Robigo*, 1958, 6, pp. 16-19, 1958. [Spanish translation.]

Some generalizations and examples illustrating the value of a planned regional distribution of resistance genes in wheat and oats to counter the build-up of destructive stem rust races (*Puccinia* [*graminis*]).

**GREEN (G. J.), PETURSON (B.), & SAMBORSKI (D. J.). Physiologic races of the cereal rusts in Canada in 1957.**—*Robigo*, 1958, 6, pp. 4-7, 1958. [Spanish translation.]

The Canada Dept Agric., Winnipeg [cf. 36, p. 686], reports that no new races of *Puccinia graminis* on wheat were detected. The widespread cultivation of Selkirk

maintains the present stable situation by its resistance to race 15B, of which 15B-1, 15B-1L, and 15B-4 are the most important sub-races. Race 56 again increased sharply, for the 3rd consecutive year.

The most common races of *P. rubigo-vera* [*P. triticina*] in E. Canada were 5, 15, 28, 58, and 126. In Saskatchewan and Alberta races 1 and 11 became predominant, displacing races 5 and 15. The rather rare race 7A [38, p. 79] of *P. graminis* on oats showed a slight increase. Races 213, 216, 274, and 279 of *P. coronata* on oats comprised nearly 45% of the isolates, being equally prevalent in E. and W. Canada. Race 264 can attack Santa Fé, Landhafer, Bond, and Victoria, 4 vars. hitherto considered as sources of resistance to crown rust [38, p. 140].

WATSON (I. A.) & LUIG (N. H.). **Wheat rust diseases in Australia.**—*Robigo*, 1958, 6, pp. 19-29, 1958. [Spanish translation.]

Some rust resistance breeding has been done in eastern Australia, especially northwards, but little in western Australia 1,000 miles distant, with a different rust flora. Spores are carried readily from W. to E., but not vice versa. *Puccinia triticina* and *P. graminis* are widespread in Australia (where *P. glumarum* does not occur), and this report is based on many years' survey and study of the distribution and severity of both pathogens [38, p. 138]. The strains 15-1, 135-1, 135-2, 68-2, 68-3, 135-3, and 135-4 of *P. triticina* (based on races as distinguished internationally) were of importance in the eastern wheat belt in 1957. The last 4 attack Spica in particular, grown in northern New S. Wales and Queensland. Mentana, Uruguay, Chinese White, and Timvera [loc. cit.] have maintained their resistance to all races and are used as breeding material, especially in efforts to add leaf rust resistance to Gabo, the main Australian var. None of the 23 leading Australian wheats is resistant to all of the prevalent strains of *P. triticina* and those able to attack Gabo, Festival, Glenwari, and Spica have recently increased.

Races of *P. graminis* are more prevalent in northern New S. Wales and Queensland where resistant vars. have therefore predominated and affected the strain prevalence differently from that in southern New S. Wales and Victoria, where vars. are more susceptible. The races occurring in Australia are 21, 34, 126, and 222, 126-1 being the only strain found in western Australia recently. The sources of resistance used in breeding are set out, with details of their reactions. Only Glenwari, Festival, and Spica are resistant to all the Australian strains of *P. graminis*.

JOHNSTON (C. O.). **Physiologic races of *Puccinia recondita* (*P. rubigo-vera* f. sp. *tritici*) in the United States in 1957.**—*Plant Dis. Repr.*, 42, 11, pp. 1244-1245, 1958.

In the annual determinations at Manhattan, Kansas [cf. 37, p. 226], 24 races of *P. recondita* [*P. triticina*] were isolated from 332 collections on wheat from 28 States. Race 15 was the most widespread and abundant, followed by 5, 122, 54, and 105. Race 58 remained dominant in the N.E. and round the Great Lakes; comparative newcomers were 130, 140, and 143.

VEENENBOS (J. A. J.). **Onderzoek naar het voorkomen van roest, *Puccinia* spp., bij Granen in 1956.** [Investigation on the occurrence of rust, *Puccinia* spp., on cereals in 1956.]—*Jaarbj. Sticht. Nederl. Graan-centr.* 2, pp. 26-32, 1957. [English summary.]

*P. glumarum*, though less severe on winter wheat than in 1955 [cf. 37, p. 81], was still serious in the northern provinces: it first occurred towards the end of Apr., a month earlier than in the previous year. Cultivation of the susceptible Heines VII is on the decline (43% of the total winter wheat area). *P. simplex* [*P. hordei*] and, in a few cases, *P. glumarum* were observed on barley and *P. dispersa* on rye. Oats were slightly infected by *P. coronifera* [*P. coronata*].

SHIFMAN (I. A.). Методы и результаты гибридизации форм бурой ржавчины злаков. [Methods and results of hybridization of cereal brown rust forms.]—*Trud. vsesoyuz. Inst. Zashch. Rast.*, **10**, pp. 137–152, 2 fig., 1958.

Experiments at the Pan Soviet Institute for Plant Protection with teleutospores of *Puccinia triticina* and other rusts from wheat, quack grass [*Agropyron repens*], 'kostra', and wild rye [*Elymus arenarius*], collected in E. Siberia, N. Kazakhstan, and the Leningrad regions are reported. Uredospores were produced on susceptible winter wheat vars. and it was shown that 15–20° C. is opt. for teleutospore production by *P. triticina* and *P. agropyrina*. A sudden change from 20–25° to 5–6°, or the reverse, was practised to obtain normal germination of teleutospores with basidiospore formation.

*P. triticina* could hybridize with *P. agropyrina* and *P. alternans* [cf. **15**, p. 430], but *P. elymi* did not hybridize with *P. triticina* or *P. agropyrina*, and *P. alternans* hybridized only with difficulty. The uredo- and teleutospore sizes of the hybrids differed from those of the parents. The hybrids of *P. triticina* × *P. agropyrina* did not infect Diamond, a winter wheat susceptible to *P. triticina*. *P. triticina*, *P. agropyrina*, and *P. alternans* are considered by the author to be only specialized forms of *P. persistens*. To limit the hybridization of these rusts the eradication of *Thalictrum* spp., *Leptopyrum* spp., and certain wild grasses is recommended.

PURDY (L. H.). Color distribution as an indicator of coverage in commercially treated Wheat seed.—*Plant Dis. Repr.*, **42**, 10, pp. 1129–1132, 1 fig., 1958.

In co-operative investigations by the U.S. Dept Agric. and the Agricultural Experiment Stations of Idaho, Oregon, and Washington 78 lots of wheat seed treated commercially with hexachlorobenzene (HCB) and mercury fungicides were examined for coverage. Colour distribution (determined visually as good, poor, or none) in 18 lots treated with 80% HCB plus a water soluble red dye indicated that 25.9% of the seed was inadequately covered. Tested against *Tilletia caries* by a modification of Zogg's method [**34**, p. 24], 30% of the samples contained seed that failed to produce a dark halo of ungerminated spores. A clearly differentiated halo occurred round well-coloured seed but rarely round that on which colour was not detectable. The halo was consistent round all seeds from a laboratory sample treated with 80% HCB at 1 or 2 oz./bush.; less so round those given ½ oz. This agrees with field observations of more consistent control of bunt with the 1 oz. than the ½ oz. rate.

The apparent commercial failure of HCB against bunt as contrasted with its promising results on an experimental scale [**37**, p. 404] can be attributed to faulty treatment in the slurry machine.

DEWEY (W. G.) & TYLER (L. J.). Germination studies with spores of the dwarf bunt fungus.—*Phytopathology*, **48**, 10, pp. 579–580, 1958.

At Cornell University, Ithaca, New York, none of the series of treatments tested, i.e. with growth regulating compounds, inorganic acids, and bases, scarification with carborundum dust, and heat treatments, shortened the germination period of spores of *Tilletia contraversa* to less than that of untreated spores (3–4 weeks). The hot water treatment recommended against loose smut of wheat [*Ustilago nuda*] only slightly retarded the germination of the dwarf bunt spores.

TYLER (L. J.) & JENSEN (N. F.). Some factors that influence development of dwarf bunt in winter Wheat.—*Phytopathology*, **48**, 10, pp. 565–571, 1958. [19 ref.]

Further studies at Cornell University [see above] have confirmed earlier observations [**33**, p. 145] that covering dormant wheat plants in winter with snow or, more

effectively, straw, favours development of *Tilletia contraversa*, a matter of importance when testing vars. for resistance [35, p. 667]. Precisely how the effect is brought about is still uncertain. A light covering of straw soon after sowing had an opposite effect.

Inoculum, generally ground diseased wheat heads, was mixed with soil, which was spread on the seeded row at 1 gal./4–5 ft.; 66 g. inoculum/bush. of soil gave double the incidence obtained with 33 g., and at 100 g. there was no further increase. Incidence was higher in sowings 1 in. deep than in those at 2 in., and in plots sown on 1 rather than on 8 Oct. Weathering of infested soil for as little as 2 months before use reduced the potency of the inoculum.

DICKENS (L. E.). **Investigations of foot rot of winter Wheat caused by *Cercospora herpotrichoides* Fron.**—*Diss. Abstr.*, 18, 5, p. 1589, 1958.

The percentage of lodged culms in plots of winter wheat infected by *C. herpotrichoides* at Cornell University, when naturally infected wheat plant debris was used as inoculum, increased with the rate of seeding, especially in early sowings. Infection level was directly correlated with lodging. Infection of seedlings inoculated at the 2-leaf stage was most severe at 8 and 10° C. soil temp. and none occurred at 25–26°: most differences in plant response to 2 levels of soil moisture were not significant. In seedlings inoculated at emergence and kept in an unheated greenhouse, high N and K favoured the disease, and though more tillers were produced there was a corresponding increase in infected tillers and in the severity of infection. At low temp. and with a long [unspecified] photoperiod both diseased and healthy plants produced considerably more tillers: root/top ratios (dry and fresh wt.) were less for diseased than for healthy plants, especially at low temp. On nutrient agar max. dry wt. of mycelium was obtained at 9°, though radial growth was somewhat greater at 21°; in liquid medium max. growth was at 18°; mycelial growth was retarded at 27° and inhibited at 30°. In the field sporulation was most abundant between 10 Apr. and 10 May.

MORALES (I. N.). **Studies on Septoria leaf blotch of Wheat.**—*Diss. Abstr.*, 18, 2, pp. 357–358, 1958.

Shake culture was the most effective method for producing large quantities of inoculum of *S. tritici* [36, p. 389] at Purdue University, Indiana, for resistance tests in greenhouse and field; Fries and malt extract media produced highly virulent inocula, but with nutrient dextrose they were avirulent, consisting exclusively of conidia produced by budding and incapable of giving germ tubes. Incubation at 60 and 70° F. produced better infection than at 80°, but post-infection development was equal at the 3 temps. Of 640 winter wheat vars. tested in the field by experimental inoculation (equal parts of 8–12-day-old shake cultures and water containing 1% gelatin to enhance spreading and sticking), 42 vars. were classified as very resistant and 98 as resistant; earliness was associated with susceptibility and lateness with resistance.

Of 237 spring wheat entries under conditions favouring natural infection in 1955, 7 entries proved very resistant and 20 resistant; field reactions corresponded closely to those obtained in greenhouse inoculations. Crosses of the resistant winter var. Nabob and the resistant spring vars. Lerma 50 and P<sub>14</sub> with the susceptible Knox and Vermilion indicated that resistance was governed by 2 independent genes lacking dominance but with additive effect. Resistance governed by a single dominant was obtained from crosses of Lerma 50 with both Lee and Mayo 54 (both susceptible) and from P<sub>14</sub> × Lee.

GOLENIA (A.), PAWEŁCZYK (E.), & SPEICHERT (H.). **Uprawa sporyszu (*Claviceps purpurea* Tul.) na Życie ozimym i jarym w świetle kilkuletnich doświadczeń.**

[Cultivation of ergot (*C. purpurea*) on winter and spring Wheat in the light of several years' experiments.]—*Biul. Zak. Hod. Roś. Lecz.*, **4**, 3, pp. 204–218, 1 diag., 1 graph, 1958. [Russian and German summaries.]

The yield of ergot [35, p. 521; 36, p. 397] obtained near Poznań, Poland, was 247 kg./ha. from winter wheat and 148 from spring, the larger yield being attributed to the larger ears, with more infection surface, and bigger sclerotia. The alkaloid content of ergots from both types of wheat varied between 0.339 and 0.587%, and was mainly affected by the weather. Bigger ergot yields were obtained in conditions favouring inoculation, incubation, and secondary infection; high average air temp. and low rainfall during sclerotial formation resulted in a high alkaloid content.

CAMPBELL (W. P.). **A cause of pink seeds in Wheat.**—*Plant Dis. Reptr.*, **42**, 11, p. 1272, 1958.

Observations by the Canada Dept Agric., Ottawa, have shown that harvesting of immature wheat may result in a translucent pink appearance of the seed distinct from that caused by *Fusarium* spp. Vars. react differently; Thatcher may on occasion have 4.7% such seed, Lemhi 12.2.

KHODYAKOV (Y. P.) & VOZNYAKOVSKAYA (Mme Y. M.). Микрофлора корней Пшеницы и некоторые её свойства. [The microflora of Wheat roots and some of its properties.]—*Microbiology, Moscow*, **25**, 2, pp. 184–190, 1956. [Received 1959. English summary.]

Field and laboratory tests at the Agricultural Microbiological Institute, Moscow, showed that 55% of all micro-organisms in the wheat root microflora are present also in the above-ground parts and are typical epiphytes. The wheat root microflora is represented by 41 spp. and 22 vars. It was established that many micro-organisms of the root microflora have the capacity to assimilate atmospheric N, to use P from organic compounds, and to stimulate the growth of roots.

KHALABUDA (T. V.). Гриби, найбільш поширені в ризосфері озимої Пшениці на півдні УРСР. [The most widespread fungi in the rhizosphere of winter Wheat in the south of Ukr. S.S.R.]—*Мікробіол. Журн.* [*J. Microbiol., Kiev*], **20**, 3, pp. 10–17, 3 fig., 1958. [Russian summary.]

Investigations by the Microbiological Institute, Kiev, showed that Mucorales and *Penicillium* spp. are predominant in the rhizosphere of winter wheat [see above], followed by *Fusarium*, *Cladosporium*, *Trichoderma*, and others. In stored wheat grain Mucorales are very rarely detected, but *Actinomucor*, *Mortierella*, and *Mycocladius* were present in the rhizosphere in the steppes of S. Ukraine [37, p. 655].

CHINN (S. H. F.) & RUSSELL (R. C.). **The control of soaking injury of Barley seed.**—*Phytopathology*, **48**, 10, pp. 553–556, 5 graphs, 1958.

At the Canada Dept Agric. Research Laboratory, Saskatoon, Saskatchewan, it was found that the soaking of barley seed of the vars. Rex, Husky, Montcalm, and Warrior for 65 hr. at 24° C. in water, as practised to control loose smut [*Ustilago nuda*: cf. 37, pp. 157, 655], caused seed injury varying from 13 to 98%. Addition of 1% NaCl to the water [loc. cit.] reduced this percentage, as shown by germination in the greenhouse, from 49 to 25, 12 to 0, 66 to 32, and 83 to 23 in the 4 vars., respectively. In field trials 2% was almost as effective, but 3% less so. On Montcalm seed 12 chemicals reduced and 5 increased the soaking injury; HgCl<sub>2</sub> at 0.02% and AgNO<sub>3</sub> at 0.1% were the most beneficial; of the other chemicals, all at 1%, ammonium phosphate and sodium citrate were as effective as NaCl, the others less so.

FARRAR (L. L.). **Preliminary studies on yellow-leaf of Oats in Georgia. I. An aphid transmissible virus.**—*Plant Dis. Repr.*, **42**, 11, pp. 1229–1236, 10 fig., 1958.

This is a more detailed account of work [37, p. 656] at Georgia Experiment Station, Experiment. In aphid transmission experiments, besides large plastic cages, individual aphid cages were made by fastening to the leaf sheet cork sections  $\frac{1}{2} \times 1$  in. with a hole in the centre, covered with nylon hose. No correlation was found between agronomic practices or nematode infestation and symptom development but the disease, apparently of virus origin, was successfully transmitted to potted plants of Victorgrain and Dubois oats and Black Hulless barley by the apple grain aphid [*Rhopalosiphum padi*]. Mechanical transmission was not achieved.

GREEN (G. J.). **Physiologic specialization in Oat stem rust in Canada.**—*Robigo*, 1958, 6, pp. 29–31, 1958. [Spanish translation.]

Surveys of oat stem rust (*Puccinia graminis*) in Canada [38, p. 140] which began in 1921 show clearly the influence of resistant vars. on the race distribution. The var. Hajira has been the most important source of resistance to stem rust in Canada.

GUSTAVSSON (A.). **New races of Oat stem rust and crown rust in Sweden.**—*Robigo*, 1958, 6, pp. 15–16, 1958. [Spanish translation.]

Further information [cf. 38, p. 75] is given on races 3, 4, 6, 7, and 7A of *Puccinia graminis* in oats. As races 3, 4, and 6 induced a susceptible instead of a resistant reaction on Rodney they are to be called 3A, 4A, and 6A. The last appears to be very virulent. A new race of *P. coronata*, identified in Värmland, Central Sweden, was designated as 297.

SIMONS (M. D.) & MICHEL (L. J.). **Physiologic races of crown rust of Oats identified in 1957.**—*Plant Dis. Repr.*, **42**, 11, pp. 1246–1249, 1 map, 1958.

Since the last compilation [37, p. 405] 4 new races of *Puccinia coronata*, Nos. 294–297, have been detected and their effects on standard vars. are tabulated. The first 2, found in the U.S.A., are similar except for the reaction of Anthony (resistant to 294, susceptible to 295), and closely related to 290 and 293. Race 296 was found in Canada and 297 in Sweden [see above]. Notable in 1957 was the increase in races attacking Victoria (70% of the total isolates); especially 216 which accounted for 40%. Races of the 264 and 290 groups, attacking Landhafer and its derivatives [see below], were widespread though not serious, but may increase rapidly if the acreage planted with these vars. is extended.

LUKE (H. H.), CHAPMAN (W. H.), WALLACE (A. T.), & PFAHLER (P. L.). **Oat selections resistant to certain Landhafer-attacking races of crown rust.**—*Plant Dis. Repr.*, **42**, 11, pp. 1250–1253, 1958.

These further observations by the U.S. Dept Agric. and the Florida Agricultural Experiment Station [cf. 37, p. 406] concern the reaction of oat selections to *Puccinia coronata* in the southern United States. Selections from Irradiated Floriland were resistant in Puerto Rico but susceptible at Quincy, Florida, where race 290 occurred. Resistance of some of the selections from a cross with C.I. 7172 as the resistant parent apparently tended to break down in hot weather; C.I. 7172, however, appears to be the most promising breeding material for the area.

ENDO (R. M.) & BOEWE (G. H.). **Losses caused by crown rust of Oats in 1956 and 1957.**—*Plant Dis. Repr.*, **42**, 10, pp. 1126–1128, 1958.

Infection by *Puccinia coronata* on winter and spring oats in Illinois in 1957 [cf. above] caused an estimated loss of 27,263,000 bush. (equivalent to \$16,900,000), the heaviest for 36 yr. Wind-borne uredospores from the S. and S.W. were respon-

sible for the initial establishment of rust on winter oats in southern Illinois under the ideal conditions of heavy rainfall and high temp., which also occurred later in the season in most other parts of the State. The performance of Clintland, highly resistant to the predominant races (202, 203, 213, and 216), was outstanding.

In 1956 the disease was severe only in northern parts of the State, with an estimated loss of 3,021,000 bush. (\$2,205,500).

ROMANKO (R. R.). **The nature of resistance of Oats to Victoria blight.**—*Diss. Abstr.*, **18**, 3, pp. 770–771, 1958.

The seedling bioassay method developed by Wheeler and Luke [35, p. 10] was used at Louisiana State University as a qualitative and quantitative test for victorin [produced by *Helminthosporium victoriae*; 36, p. 757], using mixtures of the diluted toxin and macerated tissue, or macerated cuttings which had absorbed it. The toxin was regularly recovered from the former but from the latter only when the cuttings were susceptible. While inducing a marked increase in the respiratory rate of susceptible seedlings and leaf and root tissues, victorin had no such effect on resistant plants. The author suggests that the resistant plant has a means of inactivating victorin.

GRÖGER (D.). **Weitere Untersuchungen über den Alkaloid-Stoffwechsel des Mutterkorns.** [Further studies on the alkaloid metabolism of ergot.]—*Kulturpflanze (Ber. Inst. KulturpflForsch.)*, **6**, pp. 243–257, 6 fig., 1958.

At the Institut für Kulturpflanzenforschung, Gatersleben, Germany, fertilization with calcium-ammonium-nitrate or spraying the leaves of the host (rye) with a urea solution during the development of ergot [*Claviceps purpurea*: 37, p. 717] considerably increased the soluble and the protein N contents of the sclerotia. A similar effect was produced by painting the sclerotia with urea or ammonium nitrate solutions. There is no stoichiometric relation between total alkaloid and total N in the sclerotia. Enclosure of rye plants in wire-mesh cages during ergot development lowered the alkaloid content. As shading may have the same effect, it seems possible that some quality of the light may influence the development of the alkaloids. Alkaloid content was not increased by plant treatment with growth substances. The quality of an ergot strain is determined in the earliest stage of development. During overwintering of the sclerotia practically no loss of alkaloid occurs. Only in the spring, when the stromata emerge, is a loss noticeable. It is not yet certain whether the stromata are capable of alkaloid synthesis or whether the alkaloids are translocated there.

MARAMOROSCH (K.). **Cross protection between two strains of Corn stunt virus in an insect vector.**—*Virology*, **6**, 2, pp. 448–459, 1958.

At the Rockefeller Institute for Medical Research, New York, the Rio Grande (R.G.) and Mesa Central (M.C.) strains of corn [maize] stunt virus [cf. 37, p. 533] were acquired by *Dalbulus maidis* and *D. elimatus* [cf. 32, p. 607; Kunkel, 35, p. 344] in 1 day and transmitted after incubation for 2–3 weeks. When a 1-day acquisition period for either strain was immediately followed by 1 day for the other, initial transmissions were of either type, but in subsequent weeks R.G. was transmitted predominantly and then exclusively. When individuals of *D. maidis* acquired M.C. first, R.G. being acquired 2 weeks later, they transmitted M.C. first: vice versa R.G. alone was transmitted. In plants infected simultaneously M.C. symptoms often come before the more severe symptoms of R.G. The observation that R.G. protected against M.C., but not the reverse, may indicate that R.G. multiplies faster, moves more rapidly, or is more virulent, pre-empting certain insect and plant tissues and so suppressing the transmission or multiplication of its competitor.

YAKOVLEV (Mme N. P.). О сортовой устойчивости Кукурузы к пузырчатой и пыльной головне. [On the varietal resistance of Maize to blister smut and loose smut.].—*Proc. Timiryazev agric. Acad.*, **31**, pp. 128–135, 1 fig., 1 graph, 1957. [Received 1959.]

In investigations at the Plant Protection Institute of the Timiryazev Agricultural Academy, Moscow, 1955–6, the maize vars. Voronezhskaya 76, Chakinskaya Zhemchuzhina, Partizanka, and Minnesota 13 extra and some of their hybrids were tested for resistance to blister smut [*Ustilago maydis*: **37**, p. 583] and loose smut [*Sphacelotheca reiliana*: **35**, p. 602]. Only Voronezhskaya 76 × Partizanka was moderately resistant to blister smut. Chakinskaya and Voronezhskaya 76 × Partizanka were the most resistant to loose smut. Partizanka and Minnesota 13 extra were the most resistant to both diseases and the heaviest yielders in the Moscow region.

QASEM (S. A.) & CHRISTENSEN (C. M.). **Influence of moisture content, temperature, and time on the deterioration of stored Corn by fungi.**—*Phytopathology*, **48**, 10, pp. 544–549, 1 fig., 6 graphs, 1958.

At the University of Minnesota, St. Paul, of 159 samples of maize stored commercially for 6–9 months, those with the poorest germination were found to have high percentages of fungal infection [cf. **37**, p. 474; **38**, pp. 1, 141], especially by *Aspergillus flavus* and *Penicillium* spp. When good quality yellow dent maize, inoculated with *P. sp.* and 6 *A. spp.* singly and together, was stored experimentally at 5–25° C. and 12–18% moisture content fungal invasion, causing germ damage, occurred above 10° and 14% moisture. At 14% *A. repens* was the chief invader, at 16% *A. candidus* was also very active, and at 18% *A. flavus*; the last 2 were the most injurious. Among members of the *A. glaucus* group (including *A. repens*) *A. ruber* caused most damage at 18.5%. Low temp. checked damage as effectively as low moisture. Uninoculated seed stored similarly, even at 25° and 18%, gave 92% germination after 8 months and there was no germ discoloration. Maize at harvest appears to be free from any deep infection by the fungi subsequently involved in storage rots [cf. **36**, p. 690], and germ damage apparently results entirely from micro-organisms in storage and not from any process inherent in the seed.

SERRANO (F. B.). **Rice 'accep na pula' or stunt disease—a serious menace to the Philippine Rice industry.**—*Philipp. J. Sci.*, **86** (1957), 2, pp. 203–230, 5 pl., 1958.

A full account is given of the symptoms and etiology of the disease [rice dwarf virus: map 43] and its extent and importance in the Philippines [**37**, p. 231.] It was observed in Bulacan Province in 1939, and is now widespread in the islands. The writer believes 'kadang-kadang' disease of rice, reported in 1935 in the Bicol Region, to be the same, and also a disease of rice reported to have existed in N. Borneo in 1925. The overall loss due in the Philippines is reckoned at 30% of the crop, but total destruction can be experienced. Use of resistant vars., spraying or light-trapping to control the vector, and improvement of soil conditions are recommended.

SURYANARAYANAN (S.). **Role of nitrogen in host susceptibility to *Piricularia oryzae* Cav.**—*Curr. Sci.*, **27**, 11, pp. 447–448, 1958.

Studies at the Madras University showed that while heavy N manuring normally increases the proneness to *P. oryzae* in susceptible rice vars. [**32**, p. 210], and night temps. of 20° C. alternating with day temps. of 30–35° accentuate this, with night temps. above 26° susceptible vars. show more resistance. Low night temps. facilitate N reduction and the synthesis of glutamine, which stimulates spore germination of *P. oryzae* [cf. **37**, p. 352], but only at 24–26°, the opt. for infection.

At higher temps. amide synthesis may be impaired by low nitrate reduction and by diversion of the products of photosynthesis to formation of cell wall materials.

NONAKA (F.) & YOSHII (H.). **Relation between the maturity of Rice plant and the severity of stem rot caused by *Leptosphaeria salvinii* Cat. 1. Seasonal observations on the severity and culm invasion of the causal fungus.**

NONAKA (F.) & YOSHII (H.). **Differences of the severity of Rice stem rot (*Leptosphaeria salvinii* Cat.) of the several portions of lower-part of culms and their carbohydrate and nitrogen content.**—*Sci. Bull. Fac. Agric. Kyushu*, **16**, 3, pp. 439–445, 3 graphs; pp. 455–458, 1958. [Japanese. Abs. from English summaries.]

Culm invasion of early and late rice vars. by *L. salvinii* [38, p. 142] was 10–20 days earlier and more severe in culms from which the leaf blades had been removed than in the intact ones. The infection of the early vars. was also earlier and more severe than that of the late ones at the same stage of growth.

The node and 4 cm. of the rice culm above it, the 4 cm. below the node, and the internode were, respectively, highly susceptible, somewhat resistant, and intermediately susceptible to *L. salvinii*. The carbohydrate content was the same in all these parts, but as N was higher in the nodal area, this gave the lowest C/N ratio, with which the degree of resistance is correlated.

AKAI (S.) & FUKUTOMI (M.). **Change of chlorophyll content in diseased leaves of Rice plants affected by downy mildew.**—*Ann. phytopath. Soc. Japan*, **23**, 2, pp. 85–89, 3 graphs, 1958. [Japanese. Abs. from English summary.]

At Kyoto University, Japan, the content of protochlorophyll and chlorophylls *a* and *b* in rice plants infected by mildew [*Sclerospora macrospora*: 37, p. 720] was found to be greater in the lower than in the upper leaves, whereas in healthy plants the reverse was true, the difference between the diseased and healthy plants being more clearly defined in the young leaves. The absorption spectra of the chlorophyll extracts was not affected by incidence of infection or by leaf age. Unlike rice, in the mature leaves of which hyphae are all converted to oogonia, leaves of *Digitaria adscendens* still contained fungal hyphae 40–50 days after maturing; low chlorophyll in young leaves of diseased plants was not attributed to decomposition by metabolites secreted by the pathogen.

PORDESIMO (A. N.). **Bacterial blight of Rice.**—*Philipp. Agric.*, **42**, 4, pp. 115–128, 2 fig., 1958.

A study at the University of the Philippines on rice bacterial blight (*Xanthomonas oryzae*) [map 304: cf. 36, p. 664] in the Philippines showed that starch was hydrolysed by the pathogen to a slight extent and gelatin was liquefied. Consequently the author proposes to include it in the *translucens* group under the comb. nov. *X. translucens* (J.J.R.) Dowson f.sp. *oryzae* (Uyeda & Ishiyama) Pordesimo. The disease was best induced experimentally by carborundum leaf abrasion followed by spraying with a suspension of the organism.

HIRAYAMA (S.) & UDAGAWA (S.). **Taxonomic studies of fungi on stored Rice grains. II. *Aspergillus* group.**—*Bull. Fac. Agric. Mie Univ.* **16**, pp. 7–28, 7 pl. (40 fig.), 16 fig., 1958.

*Aspergillus* spp. constituted about 40% of the fungi isolated from stored, imported [38, p. 82], and domestic rice in Japan in 1954–6 [cf. 37, p. 658], the groups most frequently represented being *A. flavus-oryzae*, *A. candidus*, *A. glaucus*, and *A. versicolor*. Among the 28 spp. and vars. described are *A. giganteus*, *A. restrictus*, *A. unguis*, *A. deflectus*, *A. terreus* var. *boedijnii*, and *A. phoenicis*, all new to Japan.

STEWART (R. B.) & REYES (L.). **Head smut of Sorghum and varietal reaction.**—*Plant Dis. Repr.*, **42**, 10, pp. 1133–1140, 1958.

The increasing severity of *Sorosporium reilianum* [*Sphacelotheca reiliana*: **36**, p. 315] in the Coastal Bend area of Texas is due mainly to the widespread planting of susceptible vars., such as Martin, Texioca 54, Combine 7078, and RS 610. Among the most resistant vars. available locally are RS 630, Caprock, Plainsman, Redbine 66, Combine White Feterita, and Combine Hegari. At College Station, greenhouse testing for resistance is practicable only during the winter; the Panhandle area would appear more suitable for such tests.

FARRAR (L. L.). **Control of covered kernel smut (*Sphacelotheca sorghi*) of grain and black loose smut (*Ustilago avenae*) of Oats with gibberellic acid in greenhouse studies.**—*Plant Dis. Repr.*, **42**, 11, pp. 1254–1261, 1 fig., 1958. [33 ref.]

At Georgia Experiment Station, Experiment, seed of pink kaffir sorghum was inoculated with *S. sorghi* and the seedlings were sprayed at the 3-leaf stage with gibberellic acid [cf. **38**, p. 130] at 10, 100, and 1,000 p.p.m. in 95% alcohol, smut counts being made at maturity. In a 2nd, similar experiment only 1,000 p.p.m. was used. In experiment 3 Santa Fé oat seed infected by *U. avenae* was further inoculated with races A-14 and A-15 and the seedlings treated as in 2; in 4 the oat seed was treated with 2,000 and 1,000 p.p.m. gibberellic acid during vacuum inoculation and the plants were grown under artificial light for a 20 hr. day. Excellent control was obtained with 1,000 p.p.m. in experiments 1, 2, and 4, and a marked reduction of smut in 3; percentages of smut in treated and control plants in 1, 2, 3, and 4 were 2:44, 0:9.5, 7.3:21.6, and 0:16.6, respectively. The stimulation of growth by the gibberellic acid apparently lessens the time for seed infection by quickening germination and also enables the plant to outgrow the fungus.

LYU (T.-S.). Устойчивость сортов к различным экологогеографическим популяциям возбудителя головни Проса. [Varieties resistant to different ecologo-geographical races of the causal agent of Millet smut.]—*Proc. Timiryazev agric. Acad.*, **31**, pp. 136–143, 1 graph, 1957. [Received 1959.]

Field and laboratory tests by the Plant Protection Section of the Agricultural Academy, Timiryazev, in 1955–6 of 14 millet vars. (*Panicum miliaceum*) infected with spores of smut (*Sphacelotheca panici-miliacei*) [*S. destruens*: **38**, p. 194] from 4 different regions showed that susceptibility ranged from 15.9 to 81.5% depending on the strain of the pathogen. M-8 and M-7 vars. were susceptible to the Moscow strain (53.3–59.1% infection) and resistant to the Khar'kov strain (5.7–18.5%). Ostrogzhsko 9 proved the most resistant to all the strains, except Odessa, regardless of the date of sowing, but only in laboratory tests.

LONG (J. K.) & ROBERTS (E. A.). **The phytotoxic and fungicidal effects of sodium o-phenylphenate in controlling green mould wastage in Oranges.**—*Aust. J. agric. Res.*, **9**, 5, pp. 609–628, 1 pl., 3 graphs, 1958.

In investigations at the Citrus Wastage Research Laboratory, Gosford, N.S.W., the occurrence of rind injury on Washington navel oranges treated against *Penicillium digitatum* with solutions of Na o-phenylphenate [cf. **36**, p. 525] was found to be due to the absorption of o-phenylphenol. The effectiveness of control depended upon the levels of both Na o-phenylphenate and o-phenylphenol. The degree of rind injury depended primarily upon the conc. of o-phenylphenol in the solution, which can be controlled by pH adjustment. The control of *P. digitatum* given by Na o-phenylphenate was superior to that obtained with borax-boric acid. Rinsing eliminated the rind injury which occurred after dipping and though it reduced the effectiveness of mould control it was effective for short-term protection (i.e. local marketing).

No rind injury occurred when injury-susceptible early Washington navel oranges were dipped for 2 min. in 0.076 M Na *o*-phenylphenate at 90° F. and not less than pH 11.7, and later rinsed with water. For the best mould control the level of reserve *o*-phenylphenol (i.e. of *o*-phenylphenate ions) should be kept relatively high. The results indicate that adjustment of the pH of 0.076 M Na *o*-phenylphenate to 11.7 would give better mould control than the addition of hexamine, which renders less *o*-phenylphenol available to the rind. As early Washington navel oranges are the most susceptible to rind injury, the use of the upper pH limit is necessary with this fruit. The evidence suggested that later navel oranges and Valencia's will tolerate a higher conc. of *o*-phenylphenol (i.e. a lower pH limit), and that with Na *o*-phenylphenate treatment at about pH 11.7 control of mould wastage on these fruits is less effective than on early navel, which presumably absorb more *o*-phenylphenol.

DIKSHIT (N. N.). **Preliminary studies on Citrus die-back in Coorg.—II. Effect of micro-element sprays and irrigation on the occurrence of chlorosis.**—*Sci. & Cult.*, **24**, 2, pp. 91–94, 1958.

In experiments at Athur, near Gonikoppal, India, to eradicate symptoms of leaf chlorosis on mandarin (*Citrus reticulata*) [21, p. 136] planted in Aug. 1955 in cleared jungle, the highest number of flush growths was produced by plants not sprayed with chemicals. Plants sprayed with Zn, Cu, Mg, Mo, and B had a comparatively lower intensity of chlorosis than those treated with Mn and Fe; irrigated plants showed higher intensity than non-irrigated; and water sprayed ones the highest. In Feb. and Mar. chlorosis was low and there was an increase in the number of new leaves; Zn alone or in combination always decreased it. Affected leaves painted individually with 1% Zn sulphate sometimes recovered a healthy green colour but no spray cured chlorosis over the whole tree.

CRAMER (P. J. S.). **A review of literature of Coffee research in Indonesia.**—*Misc. Publ. int.-Amer. Inst. agric. Sci., Turrialba*, 15, xvii+262 pp., 1957. [34 pp. ref.]

This comprehensive review includes chapters on *Hemileia vastatrix* (pp. 41–47) [36, p. 638] and other fungus diseases (pp. 48–49), with reference to *Corticium salmonicolor* [loc. cit.] and *Rhizoctonia* top die-back, a condition well known in Indonesia [16, p. 670], where attack on the stem and branches leads to asymmetrical development of the latter.

BOCK (K. R.), ROBINSON (J. B. D.), & CHAMBERLAIN (G. T.). **Zinc deficiency induced by mercury in Coffea arabica.**—*Nature, Lond.*, **182**, 4649, pp. 1607–1608, 1958.

Symptoms of Zn deficiency were observed in Oct. 1957 on trees in Kenya sprayed 4–5 months previously with phenyl mercury acetate against *Colletotrichum coffeanum* [*Glomerella cingulata*]: initially there was severe leaf scorching, and later the internodes were abnormally short [cf. 35, p. 295] with reduction in the size of the youngest leaf pairs to give a rosette effect at the shoot tips. The leaves were often chlorotic and in extreme cases were reduced to the midrib, while occasionally one pair of leaves was abnormally elongated. Leaf analysis revealed a very low Zn content at the distal ends of the shoots, particularly in those most exposed to the sun. Similar symptoms had previously been observed on Arabian coffee in the Kivu district of the Belgian Congo following spraying with an arsenic formulation [38, p. 84].

ABRAHÃO (J.). **A descoloração das folhas do Cafeeiro.** [A discoloration of Coffee leaves.]—*Biológico*, **24**, 9, pp. 171–174, 1 fig., 1958.

A chlorosis of Bourbon Amareho and Mundo Novo coffee leaves on red soils in

various localities of São Paulo, Brazil, responded favourably to treatment with 0.6%  $\text{ZnSO}_4$  [cf. above].

DARK (S. O. S.) & SAUNDERS (J. H.). **Shambat Station.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Sudan), 1957-8*, pp. 16-24, 1958.

The in-season grading for blackarm (*Xanthomonas malvacearum*) [37, p. 237] at Shambat Station confirmed that the resistance of  $B_2B_3$  Sakel and Lambert had dropped to grade 8 and that they were indistinguishable from  $B_2$  types in their reaction to Shambat inoculum.  $B_6$  resistance, however, is still maintained. Inoculation experiments indicated that a new, virulent strain of *X. malvacearum* is now present in Shambat.

In 1955-6 a new manifestation of leaf curl virus [37, p. 167] was observed on some *hirsutum* cottons, the main veins becoming thickened first rather than latterly, as in the classic form of the disease. Both forms were again observed in 1957-8 on *barbadense* cotton. Up to 1958, *G[ossypium] sturtii* (a wild Australian species with the C genom) remained immune from attack by leaf curl virus, but in May 1958 a grafted plant was found with severe major vein symptoms on 3 of its 5 growing points.

WICKENS (G. M.) & LOGAN (C.). **Plant pathology.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Uganda), 1957-8*, pp. 43-48, 1958.

At the Cotton Research Stations at Namulonge [37, p. 236] and Serere experiments were made to compare the organic Hg preparations agrosan 5W, MEMA, solusan 10, and panogen, the cuprous oxide compounds perenox, perecot, YF 4642, and YF 4656, and spergon for the control of primary infection by *Xanthomonas malvacearum* on fully fuzzed and machine-delinted seed [cf. 36, p. 244]. The chemicals were applied as dusts, slurries (1% water by wt. of seed), and 'short wet' treatments (10% water by wt. of seed), seed given the last-named treatment being sun-dried immediately after. The cuprous oxide compounds were dusted at 1:300, 1:150, and 1:50; the wettable perenox was applied as a dust and a slurry.

In the untreated plots primary infection was much higher in plants from machine-delinted than from fully fuzzed seed. Perenox applied as a slurry gave disappointing results despite excellent coverage. In general the organic Hg compounds were the most efficient and very low rates of infection followed dry agrosan 5W on fully fuzzed seed (0.1% cotyledon infection), or slurry (0.1%), or as a short wet treatment (infection nil). YF 4656 gave the best results of the cuprous oxide preparations, the figures at Serere being nil, 2.0, and 1.3% infection for dust at 1:50, 1:150, and 1:300, respectively, the corresponding figures at Namulonge being 0.4, 1.1, and 1.8%; even at 1:50, however, which somewhat reduced germination, no cuprous oxide preparation was as good as the best of the Hg treatments. Spergon dry at 1:250 with 0.5 and 0.8% infection was better than any of the cuprous oxide treatments at 1:150.

At Namulonge cuprous oxide treatments of both types of seed gave the expected degree of control of primary infection and delayed secondary, though the final level showed small difference from the untreated. Agrosan 5W on machine-delinted seed gave almost complete control throughout the season, the results being as good as those given by acid-delinting followed by MEMA short wet, the most effective treatment so far devised.

The BP 52 (C50/20) cotton strain, carrying the genes  $B_2B_{6m}$ , was virtually unaffected by inoculations of the seed, leaf, and stem with *X. malvacearum*, but was susceptible to the boll phase of the disease. Albar 49 and A56/2 were highly resistant to all inoculations, the former being the better, except in leaf resistance.

ARK (P. A.). **Longevity of *Xanthomonas malvacearum* in dried Cotton plants.**—*Plant Dis. Repr.*, **42**, 11, p. 1293, 1958.

At the University of California, Berkeley, *X. malvacearum* was recovered in culture from black arm lesions on leaves of cotton plants that had been stored dry, in paper bags, for 6 yr. at room temp. The pathogen re-induced the disease upon inoculation to cotton.

**Abyan root rot of Cotton.**—*Progr. Rep. Exp. Stas Emp. Cott. Gr. Corp. (Aden)*, 1957–8, pp. 10, 19, 1958.

K. R. M. ANTHONY, J. E. A. OGBORN, and J. H. PROCTOR describe (p. 10) a 2<sup>3</sup> factorial experiment with 3 replications carried out with all combinations of Wilds Early and BAR XLI to obtain information on the effect of formalin and N on this disease [37, p. 168]. Formalin was applied immediately before irrigation on 22 Aug. at 250 ml./sq. m. and ammonium sulphate (5 g. N/sq. m.) at sowing on 5 Sept. The results indicated that all factors had only negligible effects with 'resistant' Wilds Early. Formalin significantly controlled plant death in BAR XLI until the beginning of Nov. In later counts, however, the effect became less than the small, non-significant control obtained by the application of ammonium sulphate in the seed-bed.

The results of a study of the disease at El Kod Research Station by C. LOGAN, which are briefly summarized (p. 19), have already been noticed [38, p. 84].

SULOCHANA (MISS C. B.). **Root exudates.**—*Mem. Indian bot. Soc.* 1, pp. 94–96, 1958. [18 ref.]

A short review of the significance of root exudates in relation to the soil microflora is followed by an interim note on work at the University Botany Laboratory, Madras. After a study of the rhizosphere flora of the cotton vars. MCU 1 and K 2 [cf. 37, p. 662] had revealed selective stimulation of groups of bacteria requiring amino-acids and vitamins, these substances were assayed using X-ray mutants of *Neurospora* and strains of lactic acid bacteria. Small variations in the composition of the exudates led to further analysis of those of several well-known vars. of *Gossypium hirsutum* and *G. arboreum* to investigate a possible connexion between genetic variation and exudative activity in resistance to wilt [*Fusarium vasinfectum*: cf. 36, p. 695]. This work is now in progress.

HEYN (A. N. J.). **The occurrence of *Myrothecium* on field Cotton.**—*Text. Res. J.*, **28**, 5, pp. 444–445, 1 fig., 1958. [12 ref.]

The examination of cotton samples from Clemson, S. Carolina, and Athens, Georgia, confirmed the findings of Marsh *et al.* in respect of the common occurrence of *Alternaria*, *Cladosporium*, *Fusarium*, and *Diplodia* spp., sometimes accompanied by *Colletotrichum* sp. [cf. 28, p. 585; 30, p. 104]. The foregoing and a few other spp. associated with tightlock and boll rot [33, p. 295] are believed to be the only fungi hitherto reported on field cotton (as opposed to stored raw material and exposed fabrics, which support a much greater variety). Using a medium specially designed to promote bacterial growth, consisting of a sheet of purified cotton paper placed on a thin layer of 1% agar containing mineral salts and adjusted to pH 7–7.5 (*Text. Res. J.*, **27**, pp. 591–602, 1957), the author also obtained colonies of fungi, of which the most important were *Myrothecium verrucaria* [cf. 36, p. 205] and *Stachybotrys atra* [36, p. 113]. The former, regarded as the most powerful cellulose-destroying fungus known, was frequently associated with a yellow myxobacterium. Another fungus commonly isolated from weathering cotton on the above-mentioned medium produced a deep purple mycelium on filter paper, which was rapidly destroyed; fructifications failed to develop. Samples subsequently received from various mills bore purple spots which contained the same mycelium as the field material.

RATAJ (K.). **Virová žloutenka Lnu.** [The yellows virus of Flax.]—Abs. in *Preslia*, **30**, 4, pp. 362–363, 1958. [English summary.]

In 1955 in Czechoslovakia symptoms appeared on flax similar to yellows on flax in California [? aster yellows virus: **25**, p. 34; cf. **30**, p. 10; map 56]. In 1957 it was established that this was the 1st occurrence of the disease not only in the country but in Europe.

RATAJ (K.). **Nové biotypy houby Colletotrichum linicolum.** [New biotypes of the fungus *C. linicola*.]—Abs. in *Preslia*, **30**, 4, pp. 368–369, 1958. [English summary.]

The flax vars. R1/1, C.I. 355, C.I. 188, and R2/1 were used at the Research Institute, Sumpperk, for the determination of the behaviour of 9 biotypes of *C. linicola* [**32**, p. 253] present in Czechoslovakia. R1/1 was immune from all 9, but all vars. were susceptible to the Dutch and American biotypes.

MUSKETT (A. E.). **Studies on seed health. I. Flax.**—*Ann. appl. Biol.*, **46**, 3, pp. 430–445, 1 map, 1958.

A survey, from The Queen's University, Belfast [**26**, p. 56], of fibre flax seed produced in the United Kingdom during 1940–55 showed that seed from E. and S.E. England was relatively free from *Colletotrichum linicola*, *Polyspora lini*, and *Phoma* sp., but contamination tends to be greater in districts W. and N. of the Pennines [cf. **37**, p. 325]. *Botrytis cinerea* was general throughout the U.K., infection being usually higher in coastal and upland areas than elsewhere. Incidence of *Fusarium lini* and *Alternaria linicola* was negligible.

Tests of seed from other countries indicated the possible importance of *Polyspora lini* [map 88] in Denmark, of *B. cinerea* [cf. **37**, p. 722 and below] and *C. linicola* [map 159] in the Netherlands, of *A. linicola* as a contaminant of oil flax seed in Sweden [cf. **34**, p. 150; **38**, p. 146], and of *C. linicola* in parts of Canada [**37**, p. 238]. Disinfection with nomersan [**26**, p. 56; **35**, p. 153] should be used only to make good seed better, or where disease is likely to build up, but not as a substitute for the production of clean seed.

DE TEMPE (J.). **Infectie van Lijnzaad met Botrytis: waardering en bestrijding.** [*Botrytis* infection of Flax seed: evaluation and control.]—*Tijdschr. PlZiekt.*, **64**, 4, pp. 281–296, 1 pl., 8 graphs, 1958. [English summary.]

Infection of flax seed by *B. cinerea* was particularly heavy in the Netherlands [see above] in 1957. Following studies at the Rijksproefstation voor Zaadkontrolle, Wageningen, the author presents graphs showing the direct relationship between seed infection (determined by a blotter test) and field performance (number of plants/100 seeds, determined 2 months after sowing). Greenhouse tests in which percentage emergence was determined 2 months after sowing, with repeated removal of infected seedlings, gave results comparable with those on heavy clay soil in the field, where the emphasis was on pre-emergence damping-off with little secondary spread. In recent years thiram has proved superior to Hg compounds in the Netherlands, whether judged by emergence or the quality of the stand at harvest. The results of tests with seed harvested in 1957 [cf. **37**, p. 722] were anomalous in that thiram + a non-volatile mercurial was slightly superior to thiram in blotter and greenhouse tests, but volatile mercurials gave the best stands in the field. It would seem best to conduct fungicide trials each year in autumn so that advice may be given in time for normal sowing.

SHKLYAR (T. N.). Фитотоксичные грибы как фактор льноутомления почвы. [Phytotoxic fungi as a factor in Flax-'sick' soil.]—*Proc. Timiryazev agric. Acad.*, **31**, pp. 114–119, 2 graphs, 1957. [Received 1959.]

Laboratory analyses at the Timiryazev Agricultural Academy, Moscow, of soil from flax fields showed that *Alternaria*, *Acremoniella*, *Dematium*, and *Stachybotrys*

spp. were predominant; *Penicillium* and *Trichoderma* spp. were rare. *S. alternans* [*S. atra*] proved highly toxic to rabbits, *Fusarium* sp. was toxic only to plants. The predominant fungi produce substances which retard the growth of flax, sometimes causing complete inhibition of normal development. Crop rotation with a close check of the soil micro-organisms before applying fertilizers is recommended.

RAVINOVICH (Z. D.). Сапрофитная и патогенная грибная микрофлора Джута на юге Украины. [Saprophytic and pathogenic fungal microflora of Jute in southern Ukraine.]—*Microbiology, Moscow*, **25**, 2, pp. 217–220, 1956. [English summary. Received 1959.]

A study of jute under irrigation at Odessa University, U.S.S.R., showed that *Rhizoctonia* sp. and *Fusarium* sp. caused mass infection of seedlings. *Rhizoctonia* sp. had a deleterious effect on those at the cotyledon stage and even at 1–3 pairs of leaves; plants with 4–5 or more pairs of leaves are resistant. *Alternaria tenuis* caused yellowing of the cotyledons and death of the seedlings. *Trichothecium roseum* decreased germination and rotted the seedlings.

CARANGAL (A. R.), TUCAY (ERLINDA A.), & BERNARDO (F. A.). **Biochemical studies on Abaca mosaic and bunchy-top viruses : III. Organic acids and mosaic virus infection.**—*Philipp. Agric.*, **42**, 4, pp. 129–133, 1958.

Studies at the Central Experiment Station, Laguna, Philippines [36, p. 645], indicated that abaca plants (*Musa textilis*) susceptible to abaca [cucumber] mosaic virus contained less oxalic acid than those resistant. Immersion of suckers in 0.1 N oxalic acid solution for 3 days before planting did not inhibit virus infection or affect the level of organic acids in the leaves.

NOVÁK (J. B.). **Výskum virových chorob uceleti Oleaceae.** [Investigations on the virus diseases of the Oleaceae.]—Abs. in *Preslia*, **30**, 4, p. 365, 1958. [English summary.]

Symptoms noticed since 1949 in Czechoslovakia on ash (*Fraxinus* sp.), lilac (*Syringa* sp.), privet (*Ligustrum* sp.), and *Forsythia* sp. resemble those of a virus infection. Lilac mosaic virus [30, p. 520], one of the causes of infection, was transmitted by graft to privet, ash, and *Forsythia*. The mosaic on ash was transmitted to privet, and the mosaic on privet to lilac. Many leaf deformations were not transmissible.

GRAHAM (S. O.) & STROBE (J. W.). **The incidence of anthracnose fungi on ornamental foliage plants in Washington State greenhouses.**—*Plant Dis. Repr.*, **42**, 11, pp. 1294–1296, 1958.

Surveys during 1956–58 have shown an increase in *Gloeosporium*, *Colletotrichum*, and *Glomerella* spp. on these hosts, of which 20 are listed bearing 1 or more anthracnose fungi. New host records for the United States are *Gloeosporium* on *Cryptanthus bromelioides* and its var. *tricolor*, 3 spp. of *Philodendron*, *Stephanotis floribunda*, *Peperomia obtusifolia*, *Monstera deliciosa*, and *Syngonium podophyllum*, and *Colletotrichum* on the 3 last-named and *Aglonema commutatum*.

NELSON (P. E.) & WILHELM (S.). **Thermal death range of *Verticillium albo-atrum*.**—*Phytopathology*, **48**, 11, pp. 613–616, 1 fig., 2 graphs, 1958.

When cultures of *V. albo-atrum*, from tomato and rose, on flower stalks of *Plantago lanceolata*, were subjected to heat at the University of California, Berkeley, 5 min. in water at 47° C. killed hyphae and conidia and 40 min. at 47° or 10 min. at 50° killed microsclerotia. Infected rose [31, p. 65] and pelargonium cuttings exposed to such temps., however, could not thereafter be rooted. Microsclerotia in a dry atmosphere survived 6 months at 49–50° and 2½ yr. at 40°, though conidia at 49–50°

died within 3 days; the value of microsclerotia in survival of the fungus in dry, hot soil is thus emphasized.

KEMP (W. G.). **A new root rot of florists *Chrysanthemums* in Ontario.**—*Canad. J. Pl. Sci.*, **33**, 4, pp. 464–476, 1 pl. (4 fig.), 2 graphs, 1958.

A root rot of the White Shasta var. of *Chrysanthemum morifolium*, resulting in death of infected roots, general stunting, foliar chlorosis and necrosis, and ultimate desiccation, was reported for the 1st time in 1953 in an Ontario greenhouse, and studied by the Canada Dept Agric., St. Catharines, Ontario. Soil inoculations with monoconidial cultures of a *Phoma* sp. found associated with infected plant roots reproduced the symptoms, which were most severe on plants growing in soil maintained at 55–60° F. Inoculations of aerial parts of the plant were negative. The fungus, which was mainly a cortical pathogen, was little affected by soil pH or changes in soil humidity. It was similar to *P. chrysanthemicola* [33, p. 28] but differed in the formation of pseudosclerotial masses. It is restricted to the florists' chrysanthemum, vars. of which showed very varied susceptibility, though none proved immune. There is no evidence that the fungus is carried in cuttings; effective control was obtained by steam sterilization of soil, or fumigation with dowfume MC-2 (4 lb./100 sq. ft.).

RAABE (R. D.) & WILHELM (S.). **Verticillium wilt of garden Stock (*Matthiola incana*).**—*Phytopathology*, **48**, 11, pp. 610–613, 3 fig., 1958.

This is an account from the University of California, Berkeley, of a wilt disease induced by *V. albo-atrum* [20, p. 118; 29, p. 448] now prevalent in parts of southern California and round San Francisco. The symptoms, including yellowing of the lower foliage, resemble those of K deficiency, and of *Fusarium* wilt [27, p. 476] and other diseases of stock [17, p. 181; 20, p. 168; 22, p. 25]; isolation of the pathogen is, therefore, important for accurate diagnosis. The column and branching vars. of *M. incana*, 10-weeks (*M. i.* var. *annua*), and night scented stock (*M. bicornis*) all proved susceptible to inoculation by dipping the roots in a spore suspension. Column types were also susceptible to isolates from tomato, radish, and *Solanum sarachoides*, but not to one from Brussels sprouts.

HENNEBERRY (T. J.) & TRAVIS (R. V.). **New fungicides for the control of blackspot on Roses.**—*Plant Dis. Rept.*, **42**, 11, pp. 1297–1298, 1958.

In trials at Beltsville for the control of *Diplocarpon rosae* [38, p. 8] 50% phaltan [38, p. 181] and 70% cyprex [37, p. 540], each at 2 lb. wettable powder/100 gal., proved the best of a number of fungicides used in combination with miticides and wetting agents, and were superior to zineb. With aramite they reduced the percentage of infected foliage on 9 Oct. to 29 and 30, respectively, compared with 100 for the untreated, and with malathion to 30 and 33. Conspicuous white residues, however, were left on the foliage.

NALIVAÏKO (A. G.). Борьба с мучнистой росой на Розе. [Control of powdery mildew of Roses.]—*Zashch. Rast.*, Moscow [*Plant Prot.*, Moscow], 1958, 5, p. 57, 1958.

At the Crimea Research Selection Station, U.S.S.R., a farmyard manure decoction (manure mixed with a little soil, covered with water, left for 3–4 days, and strained) sprayed (at 300–1,000 l./ha.) on to rose bushes when symptoms of mildew (*Sphaerotheca pannosa* var. *rosae*) appeared and again 10–15 days later, reduced the disease to less than 3% infected plants in a heavily infected area.

CHANGSRI (W.) & WEBER (G. F.). **Leafspot of Marigold, *Tagetes erecta*, caused by *Septoria tageticola* n.sp.**—*Phytopathology*, **48**, 10, pp. 561–565, 3 fig., 1958.

A more detailed account is given of this disease in Florida [37, p. 87]. The pycnidia

are 42–140  $\mu$  diam., with an ostiole 14–70  $\mu$  at maturity; conidiophores  $3\text{--}6 \times 1\text{--}2 \mu$ , conidia 5-septate,  $18\text{--}57 \times 1\text{--}1.5 \mu$ . *T. patula* was resistant.

VALÁŠKOVÁ (EVA). Srovnávání účinku fungicidinu a griseofulvinu na *Botrytis tulipae* (Lib.) Lind in vitro a in vivo. [Comparison of the effects of fungicidin and griseofulvin on *B. tulipae* in vitro and in vivo.]—*Čsl. Mikrobiol.*, **3**, 5, pp. 323–325, 1958. [Russian and English summaries.]

At the Czechoslovakian Academy of Sciences, Ruzyně, near Prague, fungicidin proved more effective than griseofulvin in the inhibition of sporulation and sclerotial formation by *B. tulipae*. Confirmatory results were obtained in tests on tulip leaves. Further advantages of fungicidin are its low degree of phytotoxicity and ease of penetration.

ТҮМШЕНКО (L. F.). Влияние микроэлементов на поражаемость Подсолнечника болезнями. [The effect of micro-elements on damage by Sunflower diseases.]—*Proc. Timiryazev agric. Acad.*, **31**, pp. 144–151, 1 fig., 1957. [Received 1959.]

In experiments in 1955 at the Nemchinovka Station, Moscow area, and in 1956 at the Agricultural College in Tombovski region, with sunflower var. Barnaul'ski 2151 600 mg. of a mixture of B and Mg or 20 mg. ammonium molybdate was introduced into each hole. When the plants were in the 2-leaf stage they were sprayed with B+Mg at 50 kg./ha. and then with 0.1% Burgundy mixture every 10 days. Spraying the plant and soil with B decreased white rot (*Sclerotinia libertiana*) by 6%, grey mould (*Botrytis cinerea*) by 11%, and rust (*Puccinia helianthi*) [35, p. 827] by 10–15%, accelerated flowering, increased the specific gravity of the seeds, and the yield by 10–27%. When B and Cu compounds were used the diseases were decreased by 28% and yield increased by 20%.

ЕФИМОВА (Mme N. S.). Спорынья злаков в условиях предгорной зоны Зайлийского Ала-Тау. [Ergot on cereals in the foot hills of Zailiisky Ala-Tau.]—Тр. Алма-Атинск. зоовет. ин-та [*Trud. Alma-Ata zoovet. Inst.*], **10**, pp. 565–568, 1957. [Abs. in *Referat. Zh. Biol.*, 1958, 15, p. 211, 1958.]

An epiphytotic outbreak of ergot [*Claviceps purpurea*] on couch grass [*Agropyron repens*] in 1952 spread to many wheat, barley, and rye vars. There were cases of toxicity in cattle fed with diseased grasses and cereals.

**Surveys of Clover rot with incidental observations on Eelworm in Clover : England and Wales, 1953–55.**—*Plant Path.*, **7**, 4, pp. 115–124, 1 graph, 4 maps, 1958.

The results are presented by E. LESTER and E. C. LARGE of this survey by the National Agricultural Advisory Service in collaboration with the Plant Pathology Laboratory of the Ministry of Agriculture, Harpenden, of the distribution and economic importance of rot (*Sclerotinia trifoliorum*) [cf. 33, p. 245] in broad red or late flowering red clover in pure stands or ley mixtures. An attempt was made to distinguish between the losses caused by rot and by the eelworm *Ditylenchus dipsaci*.

Little rot was found in Wales, and that only in Monmouthshire. In England the disease was present in 70% of the fields examined in 1953 and 1954, when incidence was about normal, and in about 50% of them in 1955, when it was below normal. In 1953 and 1954 the loss of stand due to rot at the end of winter was between 6 and 24% in 10% of the crops, and over 24% in a further 10%. In 1955 the losses were about half this. The disease was most prevalent and severe in those parts of England where a 4- or 5-course rotation is practised and 1-yr. leys containing much red clover are usual. In Wales, Cumberland, Northumberland, Devon, and Cornwall, where these are few, and there is little red clover in the long-ley mixtures,

the disease is rare. Soil type and drainage showed no clear influence on the disease. Grazing or cutting in autumn reduced incidence to some extent.

Eelworm was present in about 20% of the fields, causing moderate or severe losses in 7% each year.

ELLINGBOE (A. H.). **A comparative study of fungi that cause spring blackstem of forage legumes, particularly Alfalfa and Red Clover.**—*Diss. Abstr.*, 18, 5, pp. 1571–1572, 1958.

At the University of Minnesota 112 monoconidial isolates from black stem (*Phoma trifolii*) of red clover [cf. 35, p. 828] and spring black stem (*Ascochyta imperfecta*) of lucerne [loc. cit.] were placed in 7 rather distinct cultural groups: there was no correlation between cultural type and host origin, and no differences were noted between the 2 fungal spp. when 16 isolates, 8 from each host, were compared on several media or on red clover and lucerne stems.

Temp. had a decided effect on the percentage of septate spores in some isolates from both hosts. Septate spores were almost all formed on germination in cultures regardless of host origin. In 185 collections from the 2 hosts no consistent differences in pycnidial size or morphology or spore characteristics could be detected. Hyphal anastomoses occurred as frequently between isolates from different hosts as between those from the same host, and all isolates tested were pathogenic to both. The author concludes that one fungus is involved and selects the name *Phoma herbarum* var. *medicaginis* [loc. cit.].

PEAKE (R. W.), CORMACK (M. W.), & DOWNEY (R. K.). **Evaluation of Alfalfa for resistance to bacterial wilt in field and greenhouse tests.**—*Canad. J. Pl. Sci.*, 38, 4, pp. 405–414, 7 fig., 1 graph, 1958.

Tests on lucerne for resistance to bacterial wilt (*Corynebacterium insidiosum*) by recently described methods [37, p. 102] were made by the Canada Dept Agric. Field test material was evaluated by individual inspection of plants, cut off below ground by a U-shaped blade 1 ft. wide  $\times$  2 ft. deep attached to a tractor. In greenhouse tests counts of seedlings could be taken after 3 months. Both tests were equally reliable, the latter being more useful for rapid screening of large populations under closely controlled growth conditions, while the former enabled simultaneous ratings of wilt resistance, growth habit, winter hardiness, and other qualities, which were desirable in the final evaluation of varieties.

**Jaarverslag 1957 Proefstation voor de Fruitteelt in de volle ground.** [Report for 1957 of the Experiment Station for Outdoor Fruit Culture.]—81 pp., 14 fig., 6 graphs, 1958. [English summary.]

In the mycological section (pp. 34–42) of this report from the Netherlands [cf. 37, p. 239] G. S. ROOSJE describes further tests on the Mills and Laplante method for determining apple scab (*Venturia inaequalis*) infection; under certain conditions conidia can withstand a dry period of more than 4 hr. between 2 wet leaf periods each too short to permit infection. The curative period of preparation 55 at 0.2% was shorter than that of 0.07% aaventa, but longer than that of captan, dinitro-rhodanbenzene, and tuzet at the recommended conc. Slight overdosage of tuzet may damage the fruit skin, retard shoot growth, and cause leaf discoloration.

Work was continued on the relationship between weather and the occurrence of conidial infection by *Podosphaera leucotricha* [cf. 38, p. 89] in circular plots with a source of infection at the centre: peak infection periods in Zeeland were 18–19 June and 23–26 July. In laboratory trials the incubation period was 5–10 (usually 7–10) days.

Inoculated at monthly intervals into the bark of Cox's Orange Pippin, *Phytophthora cactorum* [cf. 38, p. 14] developed best in the warmer months and *P. syringae*

in the cooler. From the examination of fallen fruit it seems likely that the fruits of all apple and pear vars. are susceptible to both fungi. *P. syringae* was not found in soil under arable cultivation since 1820, though it is of general occurrence in orchard soil. In excising bark lesions there is usually no need to cut more than 1 cm. beyond the diseased bark.

In laboratory tests captan and to a lesser extent copper oxychloride were active against *P. cactorum*.

DOCEA (E.) & DOBRESCU (ELENA). **Contribuții la studiul bolilor unor pomi și arbuști fructiferi.** [Contributions to the study of some diseases of fruit trees and bushes.]—*Grădina, Via și Livada*, **7**, 9, pp. 40–47, 6 fig., 1958. [Russian, French, English, and German summaries in suppl.]

Investigations by the Agronomic Institute, Bucharest, on known or little known diseases in Romania, showed that *Fusarium lateritium* [*Gibberella lateritia*], sometimes with *Nectria cinnabarina*, causes withering of fig and mulberry [cf. **37**, p. 564] branches; a scab on apples is caused by *Oospora mali* [**4**, p. 174] and on pears by *O. piricola*. Symptoms, diagnosis, and control of these diseases are fully described. A detailed account is given of *Sphaerotheca pannosa* var. *persicae* on peach, perithecia of which were observed for the 1st time in Romania. Control measures and resistant vars. are noted.

LOVISOLO (O.). **Attachi di Phomopsis mali sopra varie specie di piante coltivate.** [Attacks of *P. mali* on various species of cultivated plants.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (1957), 2, pp. 241–271, 6 fig., 1958. [English summary. 58 ref.]

Studies at the Università degli Studi, Turin, during 1947–52 showed that on pear, apple, apricot, almond, rose, persimmon, vine, and walnut *Diaporthe pernicioso* [cf. **30**, p. 616; **33**, p. 707; **36**, p. 770] was sometimes parasitic, but at other times present only as a saprophyte. Comparative studies of the cultural characters of isolates from the different hosts indicated that all were probably strains of one sp. The author gives a review of the literature, discusses the synonymy of the fungus, and lists the hosts at present known.

LOVISOLO (O.). **Note su alcune alterazioni dei frutti. I. Sopra un marciume delle Mele, delle Pere e dei Kaki prodotto da 'Phomopsis mali'.** [Notes on some diseases of fruit. I. On a rotting of Apple, Pear, and Persimmon caused by *P. mali*.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (1957), 2, pp. 299–315, 4 fig., 1958. [English summary. 39 ref.]

In studies in Piedmont, Italy, in 1950–1, the author investigated a storage rot of apples and pears which started in Jan. 1950. During the early part of the year the greater part of the decay was caused by *Diaporthe pernicioso*, followed (in descending order of importance) by *Sphaeropsis malorum* Peck [*Physalospora obtusa*] and *Penicillium expansum*. Isolations from persimmon gave rise to typical cultures of *D. pernicioso*, with pycnidia of type A, averaging  $7.1 \times 2.6 \mu$ , and type B,  $25 \times 1.3 \mu$ . The paper concludes with a brief review of the literature.

STAEHELIN (M.) & BOLAY (A.). **La tavelure du Pommier. I. Peut-on lutter contre la tavelure du Pommier? II. Observations et expériences en 1956 et 1957.** [Apple scab. I. Can one control Apple scab? II. Observations and experiments in 1956 and 1957.]—*Rev. rom. Agric.*, **14**, 2, pp. 15–17, 1 fig.; 4, pp. 31–33, 1 diag., 1958.

The 1st paper is a popular note on curative treatment of scab [*Venturia inaequalis*]. The 2nd reports satisfactory results, at the Stations Fédérales d'Essais Agricoles, Lausanne, in 1956 and 1957, with captan and thiram applied 20–48 hr. after the beginning of a critical period [cf. **35**, p. 302].

FRANKOVSKII (V. Y.). Про життєстійкість конідій паршів Яблуні *Fusicladium dendriticum* Fuck. [On the viability of conidia of Apple scab, *F. dendriticum*.]—Мікробіол. Журн. [*J. Microbiol., Kiev*], **20**, 1, pp. 6–7, 1958. [Russian summary.]

Tests at the Kirovgrad Agricultural Experiment Station during 1948–55 showed that conidia of *F. dendriticum* [*Venturia inaequalis*: **38**, p. 150] in overwintered leaves on the tree do not lose their germinating capacity. Conidia from leaves and petals kept in the herbarium for 9 months grew normally when placed in a damp chamber. For prevention of spring spread an autumn spraying of apple trees which do not lose their leaves in the winter is recommended.

SPRAGUE (R.). **Phytoactin shows activity against *Podosphaera leucotricha*.**—*Plant Dis. Rept.*, **42**, 11, pp. 1208–1209, 1958.

At the Washington Agricultural Experiment Station, Pullman, phytoactin [**37**, p. 75], sprayed at 100 p.p.m. on pear seedlings in the greenhouse and at 200 p.p.m. on Black Jonathan apple trees in a field plot, proved promising against *P. leucotricha*. It reduced the percentage of mildewed apple leaves from 34.2 before spraying on 30 June to 9.1 by 22 July.

REINHARDT (J. F.). **The effect of sub-freezing temperatures on the viability and pathogenicity of the fire blight pathogen, *Erwinia amylovora* (Burrill) Winslow et al.**—*Diss. Abstr.*, **18**, 2, p. 358, 1958.

Neither the incubation time for symptom development nor the number of Jonathan apple shoots blighted were decreased by freezing inoculum of a fresh isolate of *E. amylovora* [**35**, p. 25] on potato dextrose agar or Emerson agar at  $-5^{\circ}\text{C}$ . for 1, 2, or 3 hr. at the University of Illinois. When maintained at  $-4.5^{\circ}$  (frozen or supercooled) suspended in buffer medium, the death rate in the 1st 24 hr. was more rapid in the frozen, but afterwards it fell below that in the supercooled; pathogenicity was not decreased but survival was directly proportional to the conc. of bacteria in the cultures. Repeated freezing was more lethal than once; repeated subculturing on yeast extract broth decreased pathogenicity, more so under aerobic conditions than under anaerobic, the latter inducing greater susceptibility to freezing. Suspension in apple juice or bacterial ooze [cf. **17**, p. 535] gave some protection against freezing, while water gave the least. The percentage of effective inoculations and the length of the incubation period depended on the number of viable bacteria in the inoculum.

CROSSE (J. E.), BENNETT (MARGERY), & GARRETT (CONSTANCE M. E.). **Fire-blight of Pear in England.**—*Nature, Lond.*, **182**, 4648, p. 1530, 1958.

In the recent outbreak of fireblight (*Erwinia amylovora*) on pears in Kent [**38**, p. 91; cf. map 2] Williams Bon Chrétien (syn. Bartlett), often badly affected in the United States, remained virtually unaffected, though displaying little resistance in inoculation experiments. The symptoms on experimentally inoculated pear shoots and fruits were identical with those described for this organism; apple fruits and apple and hawthorn [*Crataegus* sp.] shoots were also successfully infected. The close affinity between the authors' isolates and authentic strains in culture was demonstrated by tests with bacteriophages isolated from soil taken from an affected orchard by a method recently described [**37**, p. 291].

KITAJIMA (H.). **Influence of air temperature on the incubation period of black spot disease of Japanese Pear.**—*Ann. phytopath. Soc. Japan*, **23**, 2, pp. 102–104, 1958. [Japanese. Abs. from English summary.]

At Tokai-kinki Agricultural Experiment Station, Okitsu, the percentage germination of spores of the pear black spot fungus [*Venturia pirina*: **35**, p. 623] in drops of water

on a slide was the same at various temps. but the lengths of the germ tubes differed after 16 hr. ( $256\mu$  at  $28^{\circ}\text{C}$ .,  $108\mu$  at  $12^{\circ}$ ). When spore-inoculated pear leaves were incubated at 24, 16, and  $12^{\circ}$  lesions appeared in 1, 2, and 3 days, respectively. Placing them at  $24^{\circ}$  for 4 hr. before transfer to 12 or  $16^{\circ}$  had no effect on the length of the incubation period. It appears that the air temp. influenced the fungus only after penetration, which occurred within 4 hr. at  $24^{\circ}$ .

VAN KATWIJK (W.). **Een lijnenmosaiek van Amelanchier, veroorzaakt door het ringvlekkenmosaiek virus van de Peer.** [A line pattern mosaic of Amelanchier caused by the ring pattern mosaic virus of Pear.]-*Versl. PlZiekt Dienst Wageningen* 130, pp. 165-167, 1 fig., 1956. [English summary.]

*Amelanchier* spp. in Holland frequently developed wavy line patterns and rings in green, greenish-yellow, or yellow, occasionally somewhat brown at the edges. Scions of Nouveau Poiteau and Conference pear, grafted in 1952 to affected *Amelanchier* stocks, developed weak symptoms of ring pattern mosaic [?str. of pear mosaic virus: **35**, p. 831], which disappeared in 1955, from which it is concluded that these vars. may be symptomless carriers. The symptoms were reproduced on *Amelanchier* by grafting scions of Brederode pear with ring pattern mosaic, but not with Jonathan apple infected by apple mosaic virus.

COCHRAN (L. C.) & PINE (T. S.). **Present status of information on host range and host reactions to Peach mosaic virus.**-*Plant Dis. Repr.*, **42**, 11, pp. 1225-1228, 1958.

This paper from the Agricultural Research Service, Orlando, Florida, lists 24 spp. and vars. of *Prunus* that proved susceptible to peach mosaic virus and 10 spp., which together with the tea rose and apple proved immune. All the sweet, sour, and most of the wild cherries were immune, *P. besseyi*, *P. tomentosa*, and *P. japonica*, all closely related to peach, being exceptions. The susceptibility and reaction of plum spp. are discussed; native or naturalized wild plums such as *P. americana*, *P. angustifolia*, and *P. munsoniana* [**35**, p. 618] are excellent hosts and may be reservoirs of infection. Peach vars. (218) are listed according to whether they are severely, moderately, or mildly affected.

POP (I. V.). **O viroză păgobitoare a simbuoroaselor din R.P.R.** [An injurious virosis of stone fruit trees in the Romanian People's Republic.]-*Grădina, Via și Livada*, **7**, 10, pp. 49-52, 5 fig., 1958. [Russian, French, English, and German summaries in suppl.]

A description is given of the symptoms of plum pox [cf. **37**, p. 542] on plum, apricot, and myrobalan plum [*Prunus cerasifera* var. *divaricata*] trees. D'Agen, Anna Spath, Reine Claude, Montfort, and early red plums are resistant. Apricot reacts somewhat differently from plum, but myrobalan reacts similarly. Subjecting affected shoots used for grafting to  $40-66^{\circ}\text{C}$ . for 30 min., followed by treatment with 1% potassium dichromate or cobalt nitrate is recommended.

SHNEIDER (Y. I.). Дырчатая пятнистость косточковых и меры борьбы с ней. [Shot hole of stone fruit and measures for its control.]-*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], 1958, 5, p. 24, 1958.

In fungicide tests at the Crimea Fruit and Vegetable Research Station in 1956 on 5-6-yr.-old Gayar 9 and Zolotoi Yubilei peach trees and on 5-7-yr.-old Anna Shpet and green Reine Claude plum trees, 1 spraying with 2% fuciasin at the bud stage and again with 1% after flowering and 2 weeks later resulted in only 6 and 4% bacteriosis (*Pseudomonas caucasicum*), respectively, on the 2 peach vars. compared with 40 and 35% on the unsprayed. On plum, Bordeaux (3% for the 1st spray and

1% for the 2 following) decreased incidence by 28% on the 1st var. and 13.2% on the 2nd.

GROSCLAUDE (C.) & DELMAS (J.). **Le plomb du Pêcher dans le sud-ouest de la France.** [Silver leaf of Peach in S.W. France.]—*C. R. Acad. Agric. Fr.*, **44**, 12, pp. 633–635, 1958.

In recent years silver leaf [*Stereum purpureum*: cf. **37**, p. 414] has become important in intensively cultivated peach plantations in S.W. France, affecting 50% of 5–6-yr.-old and sometimes even 3-yr.-old trees. A number of cultural practices leading to superficial root development or to loss of soil structure, which encourage the appearance of the disease, are noted.

WAY (R. D.) & GILMER (R. M.). **Pollen transmission of necrotic ringspot virus in Cherry.**—*Plant Dis. Repr.*, **42**, 11, pp. 1222–1224, 1958.

At New York State Agric. Experiment Station, Geneva, 5 of 18 cherry seedlings from a cross between healthy English Morello (female parent) and Montmorency infected by [peach] necrotic ring spot virus were found to be infected when indexed on cucumber seedlings [cf. **37**, p. 91]. In a similar cross in which both parents were virus-free all the seedlings were healthy. The possible transmission of this virus by pollen has considerable significance in any virus control programme.

DEEP (IRA W.). **Crown gall chemotherapy with terramycin.**—*Plant Dis. Repr.*, **42**, 11, pp. 1210–1213, 1958.

Following further investigations at the Oregon Agric. Experiment Station, Corvallis [cf. **37**, p. 589], the preplanting treatment now recommended for the control of *Agrobacterium tumefaciens* on Mazzard cherry is a 30 min. soak in 200 p.p.m. terramycin. At 400 p.p.m. for 30 min. the treatment eliminated incipient infection in roots planted in sterilized soil and at 800 p.p.m. for 15 min. conferred a very high degree of protection on trees in infested soil (1.6% gall as opposed to 51.7 in the untreated), but for use on a commercial scale these strengths involve danger of phytotoxicity.

ZUCKERMAN (B. M.). **Relative importance of Cranberry rot fungi during the storage and harvest seasons in Massachusetts, 1956–57.**—*Plant Dis. Repr.*, **42**, 11, pp. 1214–1221, 4 graphs, 1958.

A reappraisal of cranberry fruit rots [cf. **7**, p. 184; **11**, p. 187] by the Cranberry Experiment Station, University of Massachusetts, East Wareham, showed that *Glomerella cingulata* [var.] *vaccinii* [**37**, p. 95] was still the most serious pathogen, but that *Sporonema oxycocci* had become more prevalent than in the past. Weather conditions at flowering did not appear to be correlated with subsequent keeping quality of the berries, nor were storage rots related to earlier or later flowering induced by varying the time the land was kept under water in spring and early summer.

FRAZIER (N. W.) & POSNETTE (A. F.). **Relationships of the Strawberry viruses of England and California.**—*Hilgardia*, **27**, 17, pp. 455–513, 4 col. pl., 26 fig., 3 graphs, 1958. [52 ref.]

A comparative study at East Malling Research Station of the strawberry viruses of California and England indicated that the 'curly-dwarf mottle', mottle [**37**, p. 362], mild yellow edge [**35**, p. 875], latent-A [strain of strawberry latent virus: **37**, p. 174], and crinkle [**35**, p. 875] viruses are found in both localities; 'rusty-leaf mottle', 'lesion-B', vein chlorosis [loc. cit.], green petal [**37**, p. 132], mosaic [**35**, p. 904], raspberry yellow dwarf [**38**, p. 20], and raspberry ring spot [raspberry Scottish leaf curl: loc. cit.] viruses are not known in California; strawberry veinbanding [**35**, p. 29], 'yellow veinbanding', latent-B [strain of strawberry latent

virus], 'lesion A', and western aster yellows [cf. **32**, p. 683] viruses are not present in England; and leaf curl virus (Prentice's virus 5) [**32**, p. 573] occurred only in the glasshouse at East Malling.

The viruses studied could be grouped provisionally according to their symptoms and their vector-host relationship, but no evidence was obtained that clearly defined the level of relationships among those within the groups. Comparative tests suggested that the incubation period for the development of symptoms and the rate of virus loss by vectors are useful characters for distinguishing between strawberry viruses; the acquisition threshold period and rate of virus acquisition are less so.

Rusty-leaf mottle, curly-dwarf mottle, yellow veinbanding, lesion-A, and lesion-B are newly described virus diseases, transmitted by aphid vectors. The primary symptoms of these diseases are, respectively, slight vein-clearing; vein yellowing; inconspicuous vein-clearing; angular crooking of the midribs and lesions on the petioles and stolons; and angular midrib crooking, faint vein chlorosis, and lesions on the petioles or peduncles. The chronic symptoms are, respectively, marginal necrosis of the older leaves; mosaic and leaf distortion; conspicuous veinbanding; infrequent lesions; and infrequent lesions, with an inconspicuous chlorotic vein spotting of the crinkle type.

*Pentatrachopus thomasi* and *P. thomasi* ssp. *jacobi* are reported to be vectors of strawberry viruses and were used in California, while *P. fragaefolii* was used in all tests at East Malling. In a single trial *Amphorophora rubi* was found to be a vector of the leaf curl virus. *Nicotiana bigelovii* is a natural host of western aster yellows virus in California and *Duchesnea indica* was infected experimentally.

BOVEY (R.). **Premiers résultats d'expérimentation et de culture de Fraisiers sans virus régénérés par thermothérapie.** [First results of experimentation and of the cultivation of virus-free Strawberries restored by heat treatment.]—*Rev. rom. Agric.*, **14**, 8, pp. 65–67, 3 fig., 1958.

Clones from virus-free plants of the strawberry var. Madame Moutot, obtained by exposing infected plants to 37–38° C. for about 10 days at the Stations Fédérales d'Essais Agricoles, Lausanne, were more vigorous and gave much higher yields than infected controls, and were in addition more resistant to *Botrytis cinerea* at the first harvest.

PITCHER (R. S.) & CROSSE (J. E.). **Studies in the relationship of eelworms and bacteria to certain plant diseases. II. Further analysis of the Strawberry cauliflower disease complex.**—*Nematologica*, **3**, pp. 244–256, 3 pl. (5 fig.), 1958. [German summary.]

Further studies at East Malling Research Station, Kent, on the infestation of field strawberries by leaf and bud nematodes (*Aphelenchoides ritzema-bosi* and *A. fragariae*) and by *Corynebacterium fascians* [cf. **32**, p. 573] distinguished a true eelworm disease, resulting in feeding areas and alamate leaves, the death of which produces open-centred plants, and also a predominantly bacterial disease, 'cauliflower', of hyperplastic leaf galls initiated by *C. fascians* and modified by the eelworms. Although associated with alamate leaves, *C. fascians* plays no direct causal role; it is widespread and probably normally present in healthy plants as a saprophyte and becomes pathogenic after eelworm invasion.

PEARSON (A. J. A.). **Banana spraying with mineral oils—a new control for leaf spot.**—*Span*, **3**, pp. 2–4, 3 fig., 1958.

In oil-spraying experiments in Jamaica against banana leaf spot (*Mycosphaerella musicola*) [**38**, p. 22 *et passim*] 3 main factors found to be associated with the performance of the oils used were the UR (unsulphonatable mineral residue), viscosity, and the proportions of paraffins and naphthenes [cf. **37**, p. 448]; 4 oils of different

blend were therefore compared. Only UR was found to influence the degree of phytotoxicity; oils of UR 70 caused severe burning and those with UR below 80 should not be used; UR 90 or more is desirable if economic and if environmental conditions are not opt. An oil with the following specifications is likely to be suitable and most desirable in efficiency and cost: specific gravity at 60/60° F., 0.85–0.9; UR > 80 (preferably > 90); viscosity, secs. S.U. at 100° F., 70–120; K.V.I. > 35; neut. value, mg. KOH/g. < 0.05; distillation range, 300–400° C.; crude type, paraffinic or naphthenic; for aircraft application the flash point is also important. It is desirable that the knapsack machines employed for application be calibrated at the correct temp.

DAS-GUPTA (S. N.) & SEN (C.). **On the prevention of Mango necrosis.**—*Curr. Sci.*, **27**, 11, pp. 446–447, 1958.

Further studies at Lucknow University, India, showed that when mango plants liable to fruit necrosis by brick-kiln fumes [cf. **36**, p. 479] were sprayed before and during flowering and at fruit set with 6 lb. borax/100 gal. water 98% of the fruits were healthy (controls 100% necrotic).

KHAZARADZE (E. P.). ЗИТНОЗ Граната и борьба с ним. [Zythiosis of Pomegranate and its control.]—*Zashch. Rast., Moscow [Plant Prot., Moscow]*, 1958, 5, pp. 22–23, 2 fig., 1958.

Since 1953 a severe outbreak of *Zythia versoniana* on pomegranate [cf. **37**, p. 415] in W. Georgia, U.S.S.R., has caused 40–50% loss of fruit. Brown spots appear on the pericarp and pass into the fruit which becomes rotten or mummified. Early infection causes the flowers to drop and young branches to wither. Vars. from Azerbaijan and Middle Asia proved susceptible and developed also a collar rot, which caused many trees to die. The local vars. are resistant to the trunk canker. The presumed perfect state (*Nectriella versoniana*) [cf. **12**, p. 641] is not found in Georgia and its relation to *Z. versoniana* is not yet established. The disease is epiphytotic only in the Patara-Poti and Djolevi regions where ground moisture is very high.

Planting sparsely in dry soil, spraying with 1% Bordeaux at the bud stage, again when the fruit is  $\frac{1}{3}$  full-grown, and at the beginning of Sept. are recommended. For cankers the soil should be cleaned from the lower part of the trunk, infected bark removed, and the wounds treated with Bordeaux paste or carbolineum.

WILSON (E. M.) & ARK (P. A.). **Acti-dione as a control of seed-borne Safflower rust.**—*Phytopathology*, **48**, 11, p. 640, 1958.

At the University of California, Berkeley, complete control of seed-borne *Puccinia carthami* was obtained by soaking safflower seed for 30 min. in actidione [**36**, p. 275] at 1–1,000 p.p.m. At 100 p.p.m. and above, however, germination was progressively reduced and seedling emergence slowed down.

GREEN (R. J.). **'Deep plowing' for controlling Verticillium wilt of Mint in muck soils.**—*Phytopathology*, **48**, 10, pp. 575–577, 1 fig., 1958.

A more detailed account from Purdue University Lafayette, Indiana, of information already noticed [**37**, p. 104]. A 36-in. mould-board plough was modified by addition of a 16-in. jointer immediately ahead of the large mould board; this dropped the upper 12–14 in. of top soil, heavily infested with *V. albo-atrum* var. *menthae*, into the previous plough furrow before turning the remaining soil to a depth of 28–32 in. Wilt incidence in the 2nd yr. was reduced from 85% to 10.2%. The technique is applicable only on suitable soil types, and its overall effects on cultivation must be considered. How long the soil so treated will remain relatively disease free is as yet unknown.

GOLENIA (A.). **Rdza Mięty (*Puccinia menthae* Pers.) w warunkach centralnej Polski. IV. Badania nad przydatnością metody ciepłego odkażania sadzonek Mięty (Cz. 2).** [Mint rust (*P. menthae*) in central Poland. IV. Researches on the heat disinfection of Mint seedlings. (Part 2)]—*Biu. Zak. Hod. Roś. Leczn.*, 1958, 1 (13), 15 pp., 2 fig., 3 graphs, 1958. [Russian and German summaries.]

In continuation of this series [37, p. 674], the author reports that the most effective disinfection treatment for infected peppermint cuttings is a 10 min. immersion in water at 45° C. (apparatus for which is described). Although the mycelium was almost completely destroyed, cutting survival was reduced to 85.31–59.1% of the untreated control. The treatment is recommended only when a large number of cuttings is available, or completely uninfected material is required.

JOSHI (N. C.) & AGNIHOTRI (J. P.). **Studies on the wilt disease of Cumin (*Cuminum cyminum* L.) in Ajmer State, India.**—*Lloydia*, 21, 1, pp. 29–33, 8 fig., 1958.

An account of *Fusarium* wilt of cumin [36, p. 727], epiphytotic in the State. The causal organism, *F. oxysporum*, is described.

MARCHENKO (A. I.). **Повышение устойчивости Картофеля к заболеваниям.** [Increase of resistance in Potatoes to diseases.]—*Zashch. Rast.*, Moscow [*Plant Prot.*, Moscow], 1958, 5, pp. 26–27, 1958.

In tests at the Research Institute for Potato Growing, Moscow region, in 1956–8 applications of 4% potassium sulphate and 0.05% copper sulphate to the soil before planting controlled blight (*Phytophthora infestans*: 37, p. 592) and decreased canker (*Rhizoctonia* [*Corticium solani*: 37, p. 304]) from 15% to 4%.

Phytoncides [cf. 38, p. 242] used against storage diseases, e.g. 100 g. ground garlic/100 kg. tubers, controlled blight and reduced the other diseases considerably. Ground mountain ash leaves also gave good control.

DETILLEUX (E.). **La culture de la Pomme de terre dans la région d'Élisabethville.** [Potato growing in the Elisabethville area.]—*Bull. Inform. Inst. Étud. agron. Congo belge*, 7, 5, pp. 323–338, 4 fig., 1 diag., 1958.

In the section on potato diseases (pp. 333–334) brief notes are given on *Fusarium* wilt [*F. ? oxysporum* f. 1: cf. 28, p. 31], *Alternaria solani* [37, p. 447; map 89], blight (*Phytophthora infestans*) [cf. 37, p. 514], the virus diseases mosaic [unspecified], bigarrure [potato virus Y: 14, p. 251], frisolée [viruses X+Y: cf. 14, p. 246], and leaf roll, and *F. caeruleum* in store, with practical directions for their control. In the 1956–7 season, when *P. infestans* was very severe, the slightly susceptible vars. Gineke, Profijt, and Furore greatly outyielded the susceptible.

AURA (K.). **Suomessa viljellyn Perunan virustautisuudesta.** [Potato virus diseases in Finland.]—*Maataloust. Aikakausk.*, 29, pp. 103–110, 1957. [English summary. Received Oct. 1958.]

Serological analyses of samples of potato leaves (550 in 1955; 650 in 1956) revealed the widespread occurrence of viruses S [str. of potato paracrinkle virus] and X, only 10% of the 105 fields inspected being free from infection and many totally diseased. Var. Eigenheimer, the most widely cultivated in Finland, was particularly susceptible to X (70% infection) and Jaakko to S (71), the latter, however, being relatively seldom grown.

Both viruses caused severe infection in the native var. Hettula, cultivated only in the N. They were present together in a latent form in this var. and many others. In general, the newer vars., e.g. Siikli and Aquila, were little damaged, though Aquila was very heavily infected by virus X at an experiment station in Karjala.

Crinkle [27, p. 578] is very prevalent in the S., S.W., and coastal areas of W. Finland. According to Brummer (*Hankkija Siemenjulk.*, 1946, pp. 176–185, 1946),

mild crinkle reduced yields by 22% and severe by 46%. Virus Y, alone or in combination with X, appears to be largely confined to the S., where incidence does not exceed 5–15%. Leaf roll, usually of minor significance, was important in 1956 at some local experiment stations, mostly on the imported Dore and Saskia vars.

WEBB (R. E.) & SCHULTZ (E. S.). **On the nature of resistance to the Potato leaf-roll virus.**—Abs. in *Amer. Potato J.*, **35**, 10, p. 728, 1958.

This paper, presented at the 42nd meeting of the Potato Association of America at Indiana University, Aug. 1958, covers greenhouse and field studies over a 3-yr. period, which indicate that there are 3 types of resistance to infection with potato leaf roll virus [cf. **38**, p. 24]. The 1st, due to plant resistance to aphid colonization, is exhibited by potato selection B2834-3 with *Myzus persicae*, and to a lesser extent with *Aphis rhamni* [*A. nasturtii*]. The 2nd, associated with temp., is shown by selection X927-3 [**35**, p. 388], virtually immune at 22° C. and below, but highly susceptible at 27° and above. The 3rd is exemplified by selection B579-3 and others, only a small percentage becoming infected when heavily infested with infective *M. persicae* over the range 20–28°.

WEBB (R. E.) & SCHULTZ (E. S.). **Tuber net necrosis in relation to the time of infection with the Potato leafroll virus.**—Abs. in *Amer. Potato J.*, **35**, 10, pp. 728–729, 1958.

In a 3-yr. field study in Maine [see above] on the development of tuber net necrosis [cf. **34**, p. 805] in the susceptible Green Mountain, plants under insect-proof cages were inoculated at 10-day intervals with potato leaf roll virus, beginning shortly after emergence, by exposure to viruliferous aphids (*Myzus persicae*), which were killed after 3 days, and the cages removed. Tuber samples were taken at each inoculation and 14 days afterwards, to determine the date of tuber formation and the rate of development. The incidence of net necrosis, low in plants which were inoculated early, increased gradually with early July inoculations, rapidly in the late July and early Aug. ones, and then gradually declined with the mid-Aug. to mid-Sept., paralleled by a fall in the rate of tuber growth over that period. The period of max. symptom expression, varying from year to year, coincided very closely with the period of most rapid tuber growth (early-mid Aug. in these tests). Tests over 1 season showed no difference between 4 strains of the virus with regard to the incidence of tuber net necrosis.

HOYMAN (W. G.). **Effect of thimet on incidence of virus Y and purple-top wilt in Potatoes.**—*Amer. Potato J.*, **35**, 10, pp. 708–710, 1958.

At the N. Dakota Agricultural Experiment Station, Fargo, thimet [cf. **37**, p. 62] incorporated in fertilizer (3½ lb./250 lb. of 12–12–12 granular) applied at 250 lb./acre before planting did not reduce the incidence of virus Y, but significantly reduced that of purple-top wilt [aster yellows virus: cf. **38**, p. 96] in Red Pontiac potatoes grown from cut seed. To ensure sufficient inoculum of virus Y, leaves of a carrier, potato selection ND530, infested with *Myzus persicae*, were placed (17 and 24 June, 3 July) on rows of this selection interplanted with Red Pontiac; aster yellows virus was transmitted naturally by *Macrostes fasciifrons*.

RICHARDSON (D. E.). **Some observations on the Tobacco veinal necrosis strain of Potato virus Y.**—*Plant Path.*, **7**, 4, pp. 133–135, 1 pl., 1958.

In studies at the National Institute of Agricultural Botany, Cambridge, the tobacco veinal necrosis (TVNV) strain of potato virus Y [cf. **31**, p. 201; **36**, p. 503] infected potato vars. as readily as did typical strains of the virus. Some evidence, however, was obtained that TVNV might not easily be transmitted in the field by aphids (*Myzus persicae*) from potato plants also infected with typical virus Y, and it is

concluded that TVNV is unlikely to reach epidemic level in potato crops where the typical strains are prevalent.

EASTON (G. D.), LARSON (R. H.), & HOUGAS (R. W.). **Immunity to virus Y in the genus *Solanum*.**—*Res. Bull. Wis. agric. Exp. Sta.* 205, 32 pp., 10 fig., 1958. [88 ref.]

A report of extensive studies (noted previously in brief [37, p. 551]) on the virulence of 16 isolates of potato virus Y (14 from Brazil, Ecuador, Holland, Ireland, and Germany, and 1 each from Minnesota and Wisconsin). Presence of virus Y was determined in inoculated plants by the synergistic reaction with the ring spot strain of potato virus X in tobacco [31, p. 293]. Virulence, as determined by symptom expression in 7 potato vars. inoculated by abrasion, was rated severe in 4 isolates and medium or mild in 12, but was not paralleled by virulence in *Physalis floridana* or in 4 tobacco vars. inoculated in the same manner. VN, a veinal necrosis isolate from tobacco in Brazil [34, p. 264], did not infect mechanically inoculated susceptible potato vars., and when graft-inoculated to 5 vars. was recovered only from Red Warba; it produced severe leaf symptoms in the tobacco vars. Havana 38, Havana 425, Samsun, and White Burley, and stem necrosis in all vars. except White Burley. In Havana 425 its interaction with the potato virus X ring spot strain was more severe than that with any of the other isolates tested. The other 15 isolates produced very mild leaf symptoms on tobacco. Sap inoculation with the 4 severe isolates produced relatively mild symptoms in California Wonder pepper (*Capsicum annuum*) and *Datura metel*, while VN produced severe symptoms in both.

In testing the immunity of 40 selections of *Solanum* spp. only the severe or medium isolates were used. *S. nigrum* inoculated by abrasion was immune from 5. Seven clonal tuber lines of *S. stoloniferum* and 1 of *S. antipoviczii* were immune (abrasion or grafting), and 4 of the former immune from aphid inoculation (*Myzus persicae*) also; 19 hybrid clones had virus Y immune *S. stoloniferum* as one parent.

Plant populations from selfed seed of *S. antipoviczii* (line II), *S. tlaxacalense*, and *S. stoloniferum* were immune from mechanical inoculation, but there was segregation for immunity in *S. antipoviczii* (line I).

GRAY (ELIZABETH G.). **The control of blight in Potato crops.**—*Scot. Agric.*, 38, 1, pp. 46–47, 1958.

In N.E. Scotland in 1957 widespread and heavy losses from blight [*Phytophthora infestans*] were reported for the 1st time in many years. The higher incidence of tuber infection in sprayed crops on heavy land was particularly noticeable; such crops stayed green longer during the epidemic, and therefore prolonged the presentation of susceptible immature tubers. In wet soils which favour tuber infection it is essential to destroy the haulms as soon as the disease starts to spread, and a good yield is more likely to be achieved by planting sprouted seed than by protective spraying. The effect of soil type on tuber infection influences the choice of fungicide; on lighter, well-drained soils Cu preparations, indispensable on heavy soils, are being replaced by zineb, at least for early sprays.

DE LINT (M. M.) & MEYERS (C. P.). **Resultaten van de enquête over het optreden van de Aardappelziekte (*Phytophthora infestans* (Mont.) de Bary) in 1956.** [Results of the survey of the incidence of Potato disease (*P. infestans*) in 1956.] —*Versl. PlZiekt Dienst Wageningen* 130, pp. 118–133, 1 diag., 6 graphs, 1956. [English summary.]

The number of critical periods [30, p. 537; 38, p. 27] decreased from S. to N. Copper oxychloride and zineb were used less than in 1955, while greater use was made of copper with a sticker, and of a special spraying routine (zineb once or twice

at the outset of the spraying period, followed by copper oxychloride). In unsprayed crops on sand leaf infection occurred earlier and spread more rapidly in the S. than in the N., in correlation with the number of critical periods, but in sprayed fields on sea clay the reverse obtained [cf. **36**, p. 118]. Tuber infection was more serious than in 1955, and reduction by preventive spraying and haulm destruction was less effective [cf. **36**, p. 721].

AERTS (R.), BEAUDUIN (E.), & PORREYE (W.). **L'épidémiologie de *Phytophthora infestans* (Mont.) de Bary en 1957.** [The epidemiology of *P. infestans* in 1957.]—*Parasitica*, **14**, 2, pp. 75–83, 2 graphs, 1958. [19 ref.]

Meteorological data obtained at the Centre de Recherches, Gorseme, Belgium, in relation to outbreaks of potato blight (*P. infestans*) in 1957 are presented, the method used being based on Bourke's hourly readings [**34**, p. 540]. It is concluded that the 1st spray should be applied directly a primary focus of infection is found if meteorological conditions favour the disease; a 2nd spray should be given if conditions favouring infection persist and if rainfall is likely to have depleted the fungicidal cover, or if the period since the 1st application exceeds 10–12 days.

HODGSON (W. A.). **Spray trials with two antibiotics and an antimetabolite for Potato late blight control.**—*Amer. Potato J.*, **35**, 10, pp. 711–714, 1958.

In further trials by the Canada Dept Agric., Ottawa [**35**, p. 921], in 1956 and 1957, dihydrostreptomycin (200 p.p.m.) + spreader sticker or glycerin again gave good control on Green Mountain, with < 1.5 and 5.8% defoliation, respectively, compared with 50 and 98.1% on the untreated, but agriprep (streptomycin, 200 p.p.m.) failed in the severe epidemic of 1957, possibly because the 1st application (5 Aug.), on 1st appearance of blight (*Phytophthora infestans*) was too late, and the 6 applications were too few. Defoliation was 4.8% with COCS (at the recommended concentration) [**36**, p. 516], tested in 1957 only; all were superior to ethionine (200 p.p.m.; Merck & Co., Montreal).

WAGGONER (P. E.). **Effect of spray blasts upon the spread of a pathogenic fungus.**—*Plant Dis. Repr.*, **42**, 11, pp. 1282–1283, 1958.

At Connecticut Agricultural Experiment Station, New Haven, DDT and dilan sprays were applied to potato plants in 1953 and 1956, some of which had previously been inoculated with *Phytophthora infestans* and on which the pathogen was sporulating. Lesion counts indicated that under very moist conditions, induced by tenting with cheese cloth and sprinkling, some spread and increase of the disease could be caused, but in normal field practice the effect would be negligible compared with normal means of spread [cf. **30**, p. 368].

PARTYKA (R. E.). **The effects of some environmental factors and of certain chemicals on *Sclerotinia sclerotiorum* in the laboratory and in Potato fields.**—*Diss. Abstr.*, **18**, 5, p. 1590, 1958.

In this thesis from Cornell University, potato fields near the sea are reported to have a higher percentage of plants infected by *S. sclerotiorum* [cf. **37**, p. 261] than those in drier inland areas, especially vars. with dense heavy foliage, e.g. Green Mountain, compared with those with smaller, upright foliage, e.g. Kathadin and Kennebec. Infection early in the season caused significant yield reduction if the main stem was girdled sufficiently to cause death, but late basal stem infections or aerial infections had little effect. Under mild winter conditions fewer sclerotia survived 1–2 yr. in the upper soil levels than in the lower: survival counts were lower after 2 yr. at all levels. Only those surviving in the upper level decreased in viability after 1 yr. in the soil under mild winter conditions. Under severe winter conditions survival was uniform at all levels. Sclerotia maintained in a dry condition required

several weeks to form stipes after transfer to favourable conditions, while those buried in the soil for 1–2 yr. formed many stipes in 4–13 days. Ascospores remained viable longer at 60% R.H. than at 80 or 98.2%. Sclerotia buried deeper than 1.5 in. did not form apothecia. Cultural practices early in the season delayed apothecial formation, but there was a close correlation between it and the development of senescent leaves. A weekly av. of 60° F. or more in the surface soil was more important than rainfall in influencing stipe formation. In the laboratory terrachlor sprayed on to germinated sclerotia inhibited apothecial formation [38, p. 114], but the action was fungistatic: field spraying was ineffective. Under laboratory conditions vapam and mylone, applied as soil drenches, effectively killed sclerotia; relative soil moisture was important in determining the effectiveness of vapam.

BARUAH (H. K.), KONGER (G.), & CHOWDHURY (B.). **On susceptibility of Potato to infection by *Fusarium radiculicola* Woll.**—*Sci. & Cult.*, **24**, 2, pp. 99–100, 1 graph, 1958.

In studies at Ganhati University, India, Up-to-date tubers developed no infection on inoculation with *F. [javanicum var.] radiculicola* [32, p. 624], whereas Arran Consul showed 100% and Local 20%. The periderm of Up-to-date was more suberized than that of Arran Consul. X-ray spectrographic analyses with a counter defractometer disclosed a marked variation of the Fe content, as demonstrated by the Fe K $\alpha$  peaks, the percentage being 1.51 in Arran Consul, but only 0.52 in Up-to-date. When Up-to-date tubers were immersed in 0.1–1% ferric chloride for 1–48 hr. before inoculation with *F. j.* var. *radiculicola* infection was high, whereas in those immersed in water there was none.

DE LINT (M. M.). **Ervaringen met PCNB ter bestrijding van de Rhizoctonia-ziekte en de gewone schurft bij de Aardappel.** [Experience with PCNB in the control of *Rhizoctonia* disease and common scab in the Potato.]—*Versl. PlZiekt Dienst Wageningen* 130, pp. 134–142, 1 fig., 1956. [English summary. Received 1958.]

Treatment of clay soils with brassicol super conc. (60% PCNB) at 100 kg./ha. at planting time gave better control of black scurf (*Corticium vagum*) [*C. solani*: 38, p. 29] than seed disinfection with organic mercurials, when the crop was lifted early, and reduced the area of the tuber surface affected by scab (*Streptomyces* spp.) [loc. cit.] to  $\frac{1}{4}$ – $\frac{1}{3}$  (on clay soils) and  $\frac{1}{2}$  (sandy) that in untreated crops. In 1955 soil treatment delayed emergence and so reduced yields on clay soils: experience in 1956 was that this could be to a great extent prevented by giving the treatment 2 weeks before planting.

JOHNSTON (G. R.), DAVIES (H. T.), & LAWRENCE (C. H.). **Huron, a new white, late-maturing variety of Potato resistant to common scab.**—*Amer. Potato J.*, **35**, 10, pp. 715–720, 1958.

Huron was developed from a Hindenburg  $\times$  Sebago cross at the Experimental Farm, Fredericton, New Brunswick, by the Canada Dept Agric. It is high-yielding, very late, and of good cooking quality, and possesses moderate to high resistance to scab [*Streptomyces scabies*], particularly the deep pitted type of infection. Its reaction to potato virus X depended on the strain, it showed vague mottling with A, necrotic intolerance of Y, and was susceptible to leaf roll; there was considerable resistance to *Alternaria solani*, but susceptibility to *Phytophthora infestans*, though not to the extent of Kathadin.

TISHCHENKO (G. M.). Вплив силікатних бактерій на врожайність Картоплі. [The effect of silicate bacteria on Potato yield.]—Мікробіол. Журн. [*J. Microbiol.*, Kiev], **20**, 3, pp. 29–30, 1958. [Russian summary.]

A marked decrease in yield (17 c./ha.) of Carnea potato in the Polesya district

followed treatment with silicate bacteria in trials by the Nemishavska Experiment Station, Ukraine. An accompanying marked decrease of assimilated salts, N, P, and K was probably responsible for the yield decrease. The use of silicate bacteria for potatoes in the province needs further investigation.

**Low volume sprayers.**—*R.R.I. Plant Bull.* 39, pp. 135–139, 6 fig., 1958.

Popular notes are given on the chief types of low-volume spraying machines used on rubber plantations [cf. **38**, p. 32], mostly for herbicidal applications, including boom sprayers, mist blowers (used against *Oidium* [heveae: cf. **34**, p. 61]), fogging machines, knapsack sprayers with low-volume nozzles, and aerial sprayers.

WANG (C.-S.). **Spread and effect of chlorotic streak disease on the Sugar Cane varieties N.Co. 310 and P.T. 43–52.**—*J. agric. Ass. China*, 1958, 21, pp. 33–40, 1958. [Chinese with English summary. *Hort. Abstr.*, **28**, 4, p. 657, 1958.]

Experiments at the Tsungyeh Sugar Cane Improvement Station, [Formosa], started in 1953 with N.Co. 310 and P.T. 43–52 [**30**, p. 543], showed that the percentage of flowering canes in healthy plots of the 1st var. was 12.5 in plant cane and 51.8 in ratoons, the figures for plots with chlorotic streak virus being 8.3% and 40.1%. The total cane yields for plant and ratoon crops were 12.1 and 11.7% lower, respectively, in plots of diseased N.Co. 310 and 7.5 and 3.1% lower in P.T. 43–52. Some diseased stools bore healthy shoots and the percentage recovery was higher in P.T. 43–52 than in N.Co. 310.

STEIB (R. J.), FORBES (I. L.), & CHILTON (S. J. P.). **Studies of the effects of the ratoon stunting disease on yields of Sugarcane varieties presently grown in Louisiana.**—*Sug. Bull.*, **36**, 13, pp. 163–169, 1958.

At Louisiana Agricultural Experiment Station in 1955–57 heat treatment for the elimination of ratoon stunting virus [**38**, p. 33] increased the yield (tons/acre) of plant cane of C.P. 36–105 and C.P. 44–101 by 7.9 (32%) and 8.1 (38%), respectively [cf. **37**, p. 56]. For the 1st ratoon the corresponding figures were 12.8 (68%) and 12.7 (77%). Healthy C.P. 36–13 showed an average increase in plants and 1st ratoons combined of 6.7 tons (28%).

Although healthy C.P. 44–101 gave higher yields as ratoons than as plants, diseased ratoons yielded 12.9 tons/acre (42%) less than healthy plant crops. C.P. 47–193 and C.P. 48–103, both recently released, suffered marked losses of plant cane from the disease, but in N.Co. 310 there was no significant reduction when plant cane and 1st stubble were averaged.

Treatment resulted in an average decrease of sugar/ton (plants and ratoons) of 12% for C.P. 36–13, 9% for C.P. 44–101, 8% for C.P. 48–103, and 7% for N.Co. 310. A fall in sucrose generally accompanies a rise in cane yield, whatever the cause; because of this decrease, the percentage difference in sugar/acre between treated and untreated diseased cane is not as marked as that in cane/acre, but the disease has a serious effect on yield owing to its influence on the ratoons.

EZUKA (A.). **Studies on Japanese Exobasidium blight of the Tea plant.**—*Bull. Tôkai-Kinki agric. Exp. Sta., Tea Div.* 6, pp. 1–85, 1958. [Japanese with English summary. *Hort. Abstr.*, **28**, 4, pp. 658–659, 1958.]

Tea blight (*E. reticulatum*) [**31**, p. 258] is most severe in Sept.–Oct. when the weakened shoots become subject to other fungi, sometimes resulting in 30–50% less crop at the 1st plucking in the following year. Yabukita and Benihomare, the main Japanese vars., are very susceptible. The disease is checked by omitting the 3rd plucking and controlled by Cu fungicides, which are more effective than Hg preparations.

KELLER (K. R.). **Registration of Tobacco varieties.**—*Agron. J.*, **50**, 11, pp. 712–713, 1958.

This 1st series contains 10 vars. approved on 13 Nov. 1956 by the Crops Science Society of America. Havana 425 (Reg. No. 4) is resistant to tobacco mosaic virus [34, p. 492], and in infested fields out-yields non-resistant vars. It is slightly earlier than the older Havana 142 and 307, though yields are somewhat less. It was released in 1957 by Wisconsin Agricultural Experiment Station and the U.S. Dept of Agriculture. Virginia 45 (No. 8), developed at Virginia Agricultural Experiment Station, resists tobacco mosaic virus and black root rot (*Thielaviopsis basicola*) [30, p. 436; 32, p. 177]. Virginia 312 (No. 9) carries the glutinosa factor for resistance to [tobacco] mosaic virus; it is highly resistant to the root rot present in the part of Virginia that produces fire-cured tobacco.

HART (R. G.). **The nucleic acid fiber of the Tobacco mosaic virus particle.**—*Biochem. biophys. Acta*, **28**, pp. 457–464, 2 fig., 1 graph, 1958.

At the Cavendish Laboratory, Cambridge, purified preparations of tobacco mosaic virus, treated at 85° C. in detergent solution (*Proc. nat. Acad. Sci. Wash.*, **41**, p. 261, 1955) [cf. 36, p. 133] for 15, 40, or 60 sec. to remove protein from the rod ends, were centrifuged for 1 hr. or more at 150,000 g, and the sediment, after resuspension, was examined under the electron microscope. In water suspensions a thin fibre of ribonucleic acid could be seen projecting from one or both ends of the rod-shaped particles; in acetate buffer (pH 7) the rod lengths were similar but there was a marked extension of the fibres, apparently a result of uncoiling or unfolding. With longer detergent treatment rod length decreased and that of the fibres increased. It would seem that there is only one molecule of ribonucleic acid in the virus particle [38, p. 163].

HIRTH (L.). **Évolution de la concentration du virus de la mosaïque du Tabac en fonction des constituants biochimiques cellulaires, au cours de la croissance de tissus de Tabac cultivés in vitro. Remarques sur le dosage spectrophotométrique du virus de la mosaïque du Tabac, dans des cultures de tissus de Tabac.** [Evolution of the concentration of Tobacco mosaic virus as a function of the biochemical constituents of the cell in the course of growth of Tobacco tissues cultured *in vitro*. Observations on the spectrophotometric dosage of Tobacco mosaic virus in Tobacco tissue cultures.]—*C. R. Acad. Sci., Paris*, **247**, 20, pp. 1795–1797, 2 graphs; 21, pp. 1918–1920, 1 graph, 1958.

In further studies at the Institut Pasteur, Paris [37, p. 596], titration revealed a remarkable abundance of desoxyribonucleic acids, in comparison with other biochemical constituents, in cultures of 'habituated' tissues of P 19 de Bergerac tobacco on a  $\frac{1}{2}$ -strength Knop's medium supplemented by  $10^{-6}$  aneurin [thiamin], cysteine chlorohydrate ( $10^{-5}$ ), 10 drops of Berthelot's solution, 3.5% saccharose, and 12 g. agar/l. Antagonism between virus multiplication and the synthesis of proteins and ribonucleic acids was demonstrated in mosaic-infected tissues. The amount of virus in relation to total proteins in the cultures was about 2–4%. Tobacco leaf disks in which the virus multiplied in darkness contained 2–3 times as much of the infective principle and ribonucleic acids/mg. as did the tissues. Evidently, therefore, the ability of the protoplasm of tobacco tissue cultures for virus synthesis is appreciably inferior to that of the foliage.

The titration experiments revealed the presence in both healthy and infected tissues of an ultracentrifugable substance (X), which necessitated certain modifications in the spectrophotometric method of virus evaluation to ensure correct results.

НИКОЛОВА (Mme G. S.). **Источники азота для синтеза белка вируса Табачной мозаики.** [The sources of nitrogen in the synthesis of protein in Tobacco

mosaic virus.]—*Trud. Inst. Genet., Moscow, 1958*, 24, pp. 268–277, 2 fig., 1958.

The infiltration of Havana tobacco leaves, previously inoculated with tobacco mosaic virus [cf. 37, p. 508], with water for 30 min. decreased infection. Increase of protein in cells of detached leaves does not promote virus infection but decomposition products from which protein can be synthesized again by the virus does. Supplying detached leaves with asparagine and peptone helps the increase of virus by increasing protein synthesis in the leaf.

TIFELLI (M.). **Notizie su un attacco di *Sclerotinia sclerotiorum* (Lib.) Massee al Tabacco.** [Notes on an outbreak of *S. sclerotiorum* on Tobacco.]—*Tabacco, Roma*, 62, 688, pp. 199–216, 17 fig., 1958. [English summary.]

In 1955 Scafati 7 tobacco (used as cigar wrapping) growing under gauze near Città di Castello, Italy, was very severely attacked by *S. sclerotiorum* [cf. 30, p. 84]. On 5 Nov. 1955 there was an av. of 9–7 sclerotia/sq. m. on the ground and an abundance within the dried stalks. These sclerotia averaged 5–10 × 3–6 mm. The following year was very dry and no infection occurred. The exceptional severity in 1955 was attributed to atmospheric humidity and deep ploughing, which turned up plant debris that probably rendered the alkaline marl soil (pH 8.3–8.4) more acid, and so favoured the spread of the fungus.

GARBER (E. D.) & HEGGESTAD (H. E.). **Observations on the pathogenicity of biochemical mutants of *Pseudomonas tabaci*.**—*Phytopathology*, 48, 10, pp. 535–537, 1958.

In studies by the Dept of Botany, University of Chicago, Illinois, and the U.S. Dept Agric., Beltsville, few of the 20 vars. of tobacco and 10 *Nicotiana* spp. inoculated with 5 biochemical mutants of *P. tabaci* [cf. 35, p. 752; 37, p. 314] requiring various amino acids for growth proved susceptible and none was susceptible to all of them. *N. longiflora*, *N. repanda*, *N. rustica brasilia* and the tobacco vars. Burley 21, Bel 6–62, and Bel 248C–2D were resistant to all the mutants and to the parental strain. The only mutant pathogenic to any tobacco var. was that lacking leucine. *N. glutinosa* was susceptible to 4 of the mutants.

PILIPENKO (K. D.). Безрассадная культура Томатов устойчива к столбуру. [Non-transplanted Tomatoes resistant to stolbur.]—*Zashch. Rast., Moscow [Plant Prot., Moscow]*, 1958, 5, pp. 55–56, 1958.

A survey in the southern Ukraine, Moldavia, and Krasnodar (1949–57) showed that transplanted tomatoes were 15–20% infected by tomato stolbur virus [see below], but in non-transplanted it was less than 5%. A similar trend occurred in eggplant fields in Crimea. Sowing directly in the field is therefore suggested, especially as yields are higher with this practice.

RAZVYAZKINA (GALINA). Некоторые новые данные о вирусе столбура в СССР. [Some new data on stolbur virus in the U.S.S.R.]—*Biologia, Bratislava*, 12, 8, pp. 577–585, 1 graph, 1957. [Russian, English, & German summaries. Received Dec. 1958.]

Tomato stolbur virus was epiphytotic in N. Osetia, Caucasus, U.S.S.R. [38, p. 74], in 1954 and 1955. When the virus was transmitted to tomato plants at the 3–4-leaf stage, beginning of flowering, and full bloom by *Hyalesthes obsoletus* (the only successful vector of 7 leafhopper spp. used) [cf. 38, p. 175] it was found that the incubation periods were 12, 27 and 28 days, respectively. Plants at the cotyledon stage could not be infected. With inoculation of basal, middle, and apical leaves the incubation period was 28, 24, and 20 days, respectively, suggesting more rapid multiplication in younger leaves. No infection was obtained when the vector

fed on the roots. Bags with viruliferous leafhoppers were fixed at the ends of the leaves and the leaf tips then removed 3 cm. below the bag at intervals. Infection was established after 3, 6, and 12 hr. but not after 1 hr. It is concluded that the virus moves at about 1 cm./hr. *Convolvulus arvensis*, *Cardaria draba*, *Euphorbia* sp., and *Hypericum perforatum* are hosts of the virus; the last named, not hitherto recorded as such, is of particular local importance.

MOSTAFA (M. A.) & HARHASH (A. E.). **Studies on Fusarium-wilt disease of Tomato in Egypt. I. Morphological and cultural characters of causal Fusaria species.**—*Egypt. J. Bot.*, **1**, 1, pp. 39–51, 1 pl., 8 graphs, 1958. [Arabic summary. 24 ref.]

*F. oxysporum* [33, p. 266] and *F. moniliforme* [*Gibberella fujikuroi*], isolated at the Cairo University from wilted tomato plants from 4 localities, had opt. growth temps. of 30 and 25° C., respectively. *G. fujikuroi* formed saltants more readily at some temps. and its rate of growth exceeded that of *F. oxysporum* over the whole range of experimental pH values, though the opt. was similar for both.

ROHRINGER (R.), STAHMANN (M. A.), & WALKER (J. C.). **Biochemical changes in plant disease. Effect of Fusarium oxysporum f. lycopersici and its metabolites on leaf constituents of susceptible and resistant Tomatoes.**—*J. agric. Fd Chem.*, **6**, 11, pp. 838–843, 3 fig., 1958.

This is a joint report from the Depts of Biochemistry and Plant Pathology, University of Wisconsin, Madison, on the examination by paper chromatography and comparison of the relative abundance of free amino acids, sugars, some acidic components, and phenols in extracts from leaves of inoculated and uninoculated tomato plants susceptible (Bonny Best) and resistant (Jefferson) to wilt (*Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici*) [38, p. 101], and of cuttings from plants treated with pectic enzymes, fusaric acid, and lycomarasin solutions.

Healthy plants of both vars. were very similar in respect of the above-mentioned constituents, but infection was followed by changes in conc. in susceptible plants. Many such changes were non-specific and secondary, resulting from dehydration of the tissues by the wilting agents, but others were specifically induced by the primary action of the pathogen or its metabolites. Fusaric acid [37, p. 249] caused changes typical of those developing in inoculated susceptible plants. An acidic component of the host tissue, evidently an organic phosphate, was affected in such a way as to suggest its correlation with resistance.

MATISHEVSKA (Мме М. С.). Деякі біохімічні зміни у проростках Помідорів при штучному їх зараженні *Xanthomonas vesicatoria*. [Some biochemical changes in Tomato shoots when artificially infected with *X. vesicatoria*.]—Мікробіол. Журн. [*J. Microbiol.*, Kiev], **20**, 1, pp. 8–13, 3 graphs, 1958. [Russian summary.]

When 3 tomato vars. were inoculated with *X. vesicatoria* [31, p. 213] at the Microbiological Institute, Kiev, intensive O absorption, 200% higher than in the control, occurred in Marglobe, while in Break o'Day the increase was 123%. In both, an increase of peroxidase activity was noticed for 6–7 days, whereas in Skorospelka the period was much shorter. The increase of the enzymes in the 3 vars. was not equal.

REDMOND (D. R.). **Soil temperatures and Birch decline.**—*Bi-m. Progr. Rep. Div. For. Biol.*, Dep. Agric. Can., **14**, 5, p. 1, 1958.

In further studies on birch decline [35, p. 402] the rootlet mortality of yellow birch [*Betula* sp.] growing in soil, part of which was kept at an average of 2.6° C. above the normal, was about 75% in that part of the root system so treated (20% of all

rootlets). New twigs formed were thinner and bore curled and chlorotic foliage. Maintaining the soil temp. at  $2.8^{\circ}$  above normal in 1956 and  $3.5^{\circ}$  in 1957, round 5 yellow and 3 white birch [*B. papyrifera*] 8–10 ft. high, and keeping the moisture content above the wilting point, produced no symptoms in 1956, but in 1957 there was a failure of 40% of twigs of the yellow birch to elongate and 75% of its rootlets were dead at the end of 1957; 30–50% rootlet mortality was noted in white birch, but no symptoms of decline.

**Elm disease. *Ceratostomella ulmi*.**—*Leafl. For. Comm., Lond.*, **19**, 7 pp., 9 fig., 1958. 9d.

A brief, popular account of Dutch elm disease (*C. [Ceratocystis] ulmi*) [36, p. 794], the species attacked, and control measures, with passing reference to other elm diseases, including those caused by *Verticillium [dahliae]*: cf. 35, p. 532] and *Nectria cinnabarina* [cf. 37, p. 252], of little account in Britain.

DAVIDSON (A. G.), SMITH (C. C.), & MCCOLLOM (A. E.). **Dutch Elm disease firmly established in New Brunswick.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, **14**, 5, p. 1, 1958.

The 1st record of *Ceratocystis ulmi* on elm in Carleton County, New Brunswick [37, p. 601], was made in Nov. 1957; by 1958 the disease was firmly established in the area. Cutting out and spraying with DDT are being carried out.

GLASSCOCK (H. H.) & ROSSER (W. R.). **Powdery mildew on Eucalyptus.**—*Plant Path.*, **7**, 4, p. 152, 1958.

In July 1957 seedlings of *E. perrineana* and *E. gunnii* in a nursery at Goudhurst, Kent, became severely affected by a species of *Oidium*. In April 1958 a similar powdery mildew was found on *E. perrineana* in a nursery in the Wirral, Cheshire. The conidia in the Kent material measured  $24\text{--}30 \times 15\text{--}18$  (mean  $27 \times 15$ )  $\mu$ ; those from Cheshire were slightly smaller. No perithecia were observed. An *Oidium* with similar spores was recorded in Italy in 1948 [29, p. 66].

STRUCKMEYER (B. ESTHER), KUNTZ (J. E.), & RIKER (A. J.). **Histology of certain Oaks infected with the Oak wilt fungus.**—*Phytopathology*, **48**, 10, pp. 556–561, 11 fig., 1958. [23 ref.]

Further studies at the University of Wisconsin, Madison, concerned wilt (*Ceratocystis fagacearum*) [37, p. 741] on northern pin oak (*Quercus ellipsoidalis*), previous investigations of which are reviewed. Mycelium, rarely visible in the xylem before or during incipient wilt, develops extensively therein when leaf wilt is severe. Growth occurs centrifugally through the bordered pits of the vessels to adjacent ray and parenchyma cells and continues intracellularly to the outside of the wood. Hyphae grow into cavities formed by the collapse of proliferated ray cells and also increase between cambium and bark to form the typical mats with an outer pseudoparenchymatous stroma. These enlarge, hyphae growing out to form an interwoven network containing groups of large cells surrounded by smaller ones, resembling the early stages of perithecial development. Elsewhere in the stroma are cavities in which conidiophores and endoconidia are produced. Hyphae and tyloses are present in the xylem of infected roots; other root tissues, including the cortex, are invaded but mats do not form. Spores were found in the vessels of seedlings 4 days after inoculation and hyphae and tyloses in 18 days. Invasion of the new annual ring results in the leaf wilt in trees infected late in the previous season.

BILBRUCK (J. D.). **The Oak wilt fungus, *Ceratocystis fagacearum* (Bretz) Hunt : studies of the rate and extent of fungus penetration in Oak roots and the nature**

of a toxic principle in Oak heartwood which inhibits growth of the fungus.—*Diss. Abstr.*, **18**, 2, pp. 372–373, 1958.

Studies of black oak roots in Sinnissippi Forest, Oregon, Illinois, from July 1956 to July 1957, and of red oak roots in the Natural History Survey Nursery, Illinois, indicated that penetration by *C. fagacearum* [37, p. 317] was much slower than into the trunks following both trunk and root inoculations. Spread in roots began 1 month after inoculation and was still incomplete in black oak after 1 yr. Root inoculations of black oak were 50% successful and in the trunk nearly 100%; red oak root inoculations were 100% effective.

A toxin from the heartwood of red, black, northern pin, and bur oaks, which inhibited growth of the fungus, was soluble in water, thermostable, non-volatile, and diffusible in agar. Although commercial tannic acid was toxic at 1%, tartaric acid, also present in heartwood, was found to be the toxic principle, inhibiting at a min. of 0.6% in water solution mixed with wheat bran agar.

BOYER (M. G.). **Phytotoxic action of *Endoconidiophora fagacearum* Bretz.**—*Diss. Abstr.*, **18**, 6, p. 1954, 1958.

Observations at Iowa State College on wounded and drought-killed oaks suggested that tyloses arose following the interruption of sap flow in the xylem. Culture filtrates and spore suspensions of *E. [Ceratocystis] fagacearum* and substances isolated from vessels and sapwood did not measurably alter the rate of tylosis formation when injected into the vessels of red oak. During chromatographic analysis of sap from healthy and infected red oaks a fluorescent substance was isolated from the latter, having properties corresponding to those of aesculin; in addition tannic acid [see above] and an unknown flavonoid compound were detected. Tannic acid (and other phenolic substances) at  $10^{-5}$  M stimulated the fungus in liquid culture. Chlorotic and necrotic leaf symptoms were apparently due to a deficiency of mineral and organic constituents. Culture filtrates of the fungus induced wilting but no leaf necrosis. The component responsible for wilt appeared to be a polysaccharide containing glucose as the only reducing sugar.

ШЕМАХАНОВА (Мме N. M.). ***Hebeloma crustuliniforme* (Bull.) Fr.** — Микоризо-образователь Дуба. [*H. crustuliniforme* mycorrhizal to Oak.]—*Microbiology, Moscow*, **25**, 1, pp. 57–60, 4 fig., 1956. [Received 1959.]

At the Microbiological Institute, Moscow, a pure culture of *H. crustuliniforme* was added to sterilized soil in which sterilized acorns were sown. The fungus formed white mycorrhiza in all plants; there was none in the control seedlings.

POLUSHKINA (Мме N. S.). Септориоз Фисташки. [Septoriososis of Pistachio.]—Бюл. науч.-техн. информ. Тадж. н.-и. инст. садовод. винограде. субтроп. Руп. [*Bull. науч. tech. inform. Tadzh. n.-i. Inst. Sadovod. Vinogradst. subtrop. Cult.*], 1957, 1, pp. 67–69, 1957. [Abs. in *Referat. Zh. Biol.*, 1958, 15, p. 214, 1958.]

*Septoria pistaciae* had damaged 98–100% of the leaves of pistachio by Sept. in the Kamchinski district, Stalinabad, U.S.S.R. The disease is present all over the Tadzhik S.S.R. The best control was given by 5%  $\text{CuSO}_4$  + 1% Bordeaux mixture.

BAGCHEE (K.). **The fungal diseases of Sal (*Shorea robusta* Gaertn.) III. The root rot disease of Sal due to *Polyporus shoreae* Wakef. (partridge wood rot).**—*Indian For. Rec.*, N.S. Mycol., **1**, 9, pp. 185–197, 6 pl. (2 col.), 8 fig., 1957. [Received July 1958.]

A detailed account is given of the distribution and pathology of the disease, the morphology of the fungus in nature and in culture, and control [cf. 33, p. 58]. The only other host is *S. assamica*.

The disease is present, though not evenly distributed, along the foothills of the Himalayas from Saharanpur and Dehra Dun in Uttar Pradesh to Nowgong in Assam. Mortality is high in Gorakhpur [36, p. 433] and the disease is rampant in the Jalpaiguri, Buxa, Kurseong, Kalimpong, and Darjeeling divisions of Bengal, and at Haltugaon in the Goalpara division, Assam, where a pure stand covering 25 sq. miles is affected, over 80% of mature trees being moribund and 10% of these dry at the time of inspection. In Bihar the disease is present in the Chota Nagpur area, being restricted to the valleys, where high quality trees are attacked in groups. In plantations in several regions of Uttar Pradesh and Bengal apparently sound trees are dying in groups or rings. In plantations recently cut from virgin mixed forest in the *tarai* region infection is spreading to the young trees from stumps.

TRIONE (E. J.). **The physiology and pathology of *Phytophthora lateralis* on native *Chamaecyparis lawsoniana*.**—*Diss. Abstr.*, 18, 5, pp. 1590–1591, 1958.

At Oregon State College *P. lateralis* [36, p. 800], a slow-growing 'cool-weather' fungus, was found to require abundant moisture. Thiamine was the only vitamin required, and growth, which occurred over the pH range 3.7–7.8, was best at 5.3–6.9. Under natural conditions sporangia developed abundantly on twigs between 5 and 20° C. Zoospores, the prime cause of leaf infection, germinated at 5–25° C., zoospore infections occurring over the same range. There are 2 main stages in the disease, an aerial stage, starting in the mild, rainy weather of autumn, and a root stage. Soil inoculum builds up rapidly as the moist soil grows warm in spring. In the warm dry weather of late spring the rate of development of the aerial stage is slowed down, and foliar infections cease at the end of the rainy season when the foliage dries. Resistant chlamydospores and oospores are present in dried, infected, twigs and appear important as an overwintering stage whether in the litter or in the dried foliage still on the trees. Disturbance of the surface soil by logging operations roughly doubled the incidence of the disease on the roots. *C. lawsoniana* is seriously threatened by this pathogen throughout its native range.

JACKSON (L. W. R.) & PARKER (J. N.). **Anatomy of fusiform rust galls on Loblolly Pine.**—*Phytopathology*, 48, 11, pp. 637–640, 8 fig., 1958.

At the University of Georgia, Athens, *Cronartium fusiforme* [37, p. 562; 38, p. 39] was studied on *Pinus taeda* in sections of gall tissue stained with Cartwright's safranin and picro-aniline blue (*Ann. Bot., Lond.*, 43, pp. 412–413, 1929). The hyphae, which spread freely in the intercellular spaces of the cortex, average 3.5  $\mu$  diam. and are septate, with uninucleate cells. Haustoria, constricted in passage through the cell wall, are allantoid, unbranched, and uninucleate. In older galls the fungus spreads radially along the phloem rays to a depth of 2–3 rings and haustoria invade the cortical parenchyma, phloem, and wood rays and resin duct cells, greatly increasing the size and number of cells in the wood rays. Periderm barriers are formed in the phloem in front of advancing hyphae which appear to stimulate an abnormally early break in dormancy and formation of new tracheids in the spring.

KAZADAЕV (S. A.). Зараженность Сосняков Воронежского заповедника корневой губкой и опытные работы по защите их от усыхания. [The infection of Pine in Voronezh forests by root fungi and research for the control of dying off.]—*Trud. voronezh. Zapov.*, 1957, 7, pp. 133–145, 1957. [Abs. in *Referat. Zh. Biol.*, 1958, 17, p. 210, 1958.]

Surveys during 1950–54 in the Voronezh forests, U.S.S.R., disclosed that 20–50-yr.-old pine trees were severely infected by *Fomitopsis annosa* [*Fomes annosus*: 36, p. 675] and that 70–80-yr.-old trees were dying-off intensively. Infection was not apparently influenced by the soil. Removing the leaf layer and thus hindering

the appearance of new foci of infection checked infection to some extent. Complete eradication of the roots of dead trees is necessary as they are the primary source of infection.

KOZŁOWSKA (CZESŁAWA). **Badania nad zwalczaniem grzyba zgorzelowego *Fusarium bulbigenum* (Cke) Mars. v. *blasticola* (Rostr.).** [Study on the control of *F. bulbigenum* var. *blasticola* causing damping off.]—*Roczn. Nauk lesn.*, **15**, 158–160, pp. 237–256, 1957. [Russian and English summaries. Abs. in *Referat. Zh. Biol.*, 1958, 15, p. 208, 1958.]

In laboratory experiments 0.05% quinosol inhibited spore formation of *F. bulbigenum* var. *blasticola* causing damping-off of pine with no adverse effect on the seedlings; 0.5% formalin, 1%  $\text{KMnO}_4$ , and 1%  $\text{CuSO}_4$  had no effect.

GIBSON (I. A. S.). **Phytotoxic effects of copper fungicides on acid soils.**—*E. Afr. agric. J.*, **24**, 2, pp. 125–127, 2 fig., 1958.

In 1957 and 1958 pine seedlings at forest stations in South Aberdares, Kenya, suffered from necrosis of the rootlets and failure to penetrate the soil of the seed-bed, and curling of the root, causing the seedling to fall on its side. The soils were acid (pH 4.5–5), and to see whether the damage might be due to interaction between these and perenox (50% cuprous oxide), applied against damping-off [35, p. 798], local forest soil was acidified to various levels by the addition of aluminium sulphate and at each level the survival of *Pinus patula* seedlings was compared in pots given perenox (0.3% suspension weekly at 1 gal./2 sq. yd.) or left untreated. The toxic effects proved to be due to such interaction and cuprocide (80% active ingredient) behaved similarly; both *P. patula* and *P. radiata* were equally liable to suffer. Old stocks of the fungicides appeared to be more toxic than fresh materials.

GERSONDE (M.). **Untersuchungen über die Giftempfindlichkeit verschiedener Stämme von Pilzarten der Gattungen *Coniophora*, *Poria*, *Merulius* und *Lentinus*. I. *Coniophora cerebella* (Pers.) Duby. II. *Poria vaporaria* Fr. und *Poria vaillantii* (DC.) Fr.** [Studies on the toxin sensitivity of various strains of fungus species of the genera *Coniophora*, *Poria*, *Merulius*, and *Lentinus*. I. *C. cerebella*. II. *P. vaporaria* and *P. vaillantii*.]—*Holzforschung*, **12**, 1, pp. 11–19, 1 fig., 1 graph; 3, pp. 73–83, 1 fig., 6 graphs; 4, pp. 104–114, 1 fig., 2 graphs, 1958. [English summaries.]

Seven strains of *C. cerebella* [*C. puteana*] differing widely in their capacity for destruction of pine sapwood blocks in malt agar cultures in Kolle flasks were used in these studies at the Bundesanstalt für Materialprüfung, Berlin-Dahlem. They were most sensitive to  $\text{Na}_2\text{HAsO}_4$  and  $\text{HgCl}_2$ , slightly less so to NaF and  $\text{MgSiF}_6$ , and most resistant to coal tar creosote and  $\alpha$ -chloronaphthalene. The ratios of the threshold values of the most sensitive strains to those of the most resistant were approximately as follows:  $\text{Na}_2\text{HAsO}_4$  1:12,  $\text{HgCl}_2$  1:7, pentachlorophenol 1:5, coal tar creosote 1:3, NaF 1:2, and  $\text{MgSiF}_6$  and  $\alpha$ -chloronaphthalene 1:4 each. It is estimated that the amounts necessary to destroy the most resistant cultures (in comparison with the standard strain) would have to be raised at least 5 times for  $\text{Na}_2\text{HAsO}_4$  and  $\text{HgCl}_2$ , 4 for pentachlorophenol, and 3 for creosote.

The 4 strains of *P. vaporaria* differed appreciably in appearance and growth of the aerial mycelium and intensity of attack on the blocks, but the 3 of *P. vaillantii* were very similar. In general, the cultures were most sensitive to NaF and  $\text{MgSiF}_6$ , followed by  $\text{HgCl}_2$ ,  $\text{Na}_2\text{HAsO}_4$ , pentachlorophenol,  $\alpha$ -chloronaphthalene, and coal tar creosote. The ratios of the threshold values, as above, were: pentachlorophenol 1:10,  $\text{MgSiF}_6$  1:7,  $\alpha$ -chloronaphthalene 1:5, NaF 1:3.3,  $\text{Na}_2\text{HAsO}_4$  and coal tar creosote 1:3, and  $\text{HgCl}_2$  1:1.7. Thus, the quantities requisite to destroy the standard culture would have to be increased 4-fold for

MgSiF<sub>6</sub> and NaF and 3-fold for coal tar creosote to ensure protection against the most resistant strains.

GOLUBINTSEVA (Mme A. P.). Кила Капусты в западной Сибири. [Club root of Cabbage in west Siberia.]—*Zashch. Rast., Moscow* [*Plant Prot., Moscow*], 1958, 5, p. 56, 1 fig., 1958.

The Novosibirian Station for Plant Protection investigated in 1957 the spread of club root [*Plasmiodiophora brassicae*: map 101] in the highly acid region of Kemerovo (where there was 50–60% loss), Tomsk, and Tyumen.

MISHUSTIN (E. N.) & NAUMOVA (Mme A. N.). Применение бактериальных удобрений при посеве семян овощей в торфоперегнойные питательные кубики. [Application of bacterial fertilizers when sowing vegetables in turf-humus cubes.]—*Microbiology, Moscow*, 25, 1, pp. 41–48, 2 fig., 1956. [Received 1959.]

The addition of 5 ml. azotobacterine and 1 ml. phosphorobacterine to individual cubes + a triple dose of slaked lime before sowing cabbage and tomato seeds increased germination by 28% and 76%, respectively, and reduced the incidence of cabbage club root (*Plasmiodiophora brassicae*) [37, p. 333] from 27% in the untreated to nil.

BUCUR (ELENA). Putregaiul bacterian al Verzei. [Bacterial rot of Cabbage.]—*Anal. Inst. Cerc. agron., N.S.*, 25, 6, pp. 551–574, 6 fig., 1 map, 1957. [Russian and French summaries. 68 ref. Received Dec. 1958.]

This detailed report, based on 3 year's investigations by the Phytosanitary Institute of Romania, on cabbage black rot (*Xanthomonas campestris*) [38, p. 43] (widespread in the country), states that infection occurs at 100% humidity and 22–26° C. The floral organs are not infected and bacteria do not penetrate the seed, though this may subsequently become infected on the surface. The main source of infection is diseased plant remains in the soil and it is transmitted by irrigation, rain, and wind, and also by contaminated seed. Likurishka and Varza de Buzăn are the most resistant vars., Ruhm von Enkhuizen, Copenhagen Market, and Junie Riesen have medium resistance, and Erstling, Mohrenkopf, Zenith, Dittmark, and Erste Ernte are susceptible. Formalin (2.5%) applied to infested soil reduced infection by 50%.

BUCUR (ELENA) & VANKY (K.). Contribuții la studiul putregaiului bacterian al Verzei (*Xanthomonas campestris* (Pammel) Dows.). [Contribution to the study of Cabbage bacterial rot (*X. campestris*).]—*Comun. Acad. Repub. rom.*, 6, 9, pp. 1111–1115, 1956. [Russian and French summaries. Received Dec. 1958.]

Wound infection of the vascular bundles of cabbage by *X. campestris* resulted in the appearance of symptoms within 7–11 days, whereas with infection through the hydathodes 16–19 days elapsed, and through the stomata 20–22 days.

LOUVET (J.). La maladie des taches noires du Colza, *Alternaria brassicae* (Berk.) Sacc. [The black spot disease of Colza, *A. brassicae*.]—*C. R. Acad. Agric. Fr.*, 44, 13, pp. 694–701, 1958.

In recent years *A. brassicae* [cf. 37, p. 428] has caused important damage to the pods of turnip rape in various parts of France. Before an epidemic can occur the fungus must sporulate on the leaves, be dispersed by wind, and penetrate the pods, each stage being influenced mainly by the prevailing weather. In 1955 and 1956 massive contamination occurred on a date preceded by 6 days of drought, little wind, and prolonged daily sunshine. On the day the pods became infected the

weather was stormy, with a high wind, over 80% R.H. in the shade for 13 hr., and temp. between 15° and 22° C. for 36 hr. This permitted the spores to germinate and parasitize the pods. In 1957 and 1958 such conditions did not occur while the pods ripened, and there was no epiphytotic. The paper concludes with a general discussion of control methods, the number of spray applications necessary depending on the weather conditions.

LISTER (R. M.). **Some Turnip viruses in Scotland and their effect on yield.**—*Plant Path.*, **7**, 4, pp. 144–146, 1958.

In the autumn of 1956 fields of turnips were seen in Angus and Perthshire in which almost all the plants had yellow, crinkled leaves and were stunted, owing to infection by both turnip crinkle and turnip yellow mosaic viruses [37, p. 698], which are transmissible together mechanically and by flea-beetles (*Phyllotreta* sp.). The same viruses were also isolated from apparently healthy swedes growing alongside infected turnips. In the same year a strain of turnip rosette virus [loc. cit.] was isolated from swedes growing near Dunkeld, Perthshire; infected swedes and turnips were also found near Invergowrie in 1957. Turnip crinkle virus was inactivated at 85° C., but not 80°, the other 2 at 75°, but not 70°.

Experimental infection experiments in the field showed that the strains of turnip crinkle and turnip yellow mosaic viruses used had little effect on root development in turnips inoculated at the 6–8 leaf stage, though glasshouse tests indicated that earlier infection by flea-beetles may kill or severely injure turnip seedlings.

HULL (R.). **Sugar Beet yellows in Great Britain, 1957.**—*Plant Path.*, **7**, 4, p. 131, 1958.

In 1957, in 148 fields sampled an average of 2.2, 23.6, 42.5, and 56.8% of the sugar beet plants were affected by yellows virus [cf. 37, p. 613] at the end of June, July, Aug., and Sept., respectively. The percentage of the whole crop of 405,400 acres with under 1% infection at the end of Aug. was 10.8; with 1–20% was 24.7; with 21–60% was 26.7; and with over 60% was 37.8. The loss of root yield was estimated at 1,039,000 tons. The estimated potential yield was 13.3 tons of roots/acre, which was exceeded only in 1950 and 1953, while the calculated loss of root yield exceeded the previous highest, 944,000 tons in 1949 [cf. 29, p. 598].

PAYNE (M. G.), GASKILL (J. O.), FULTS (J. L.), & DANIELS (L. B.). **Exploratory studies on the use of paper chromatography and electrophoresis for detection of the yellows virus in Sugar Beet.**—*J. Amer. Soc. Sug. Beet Technol.*, **9**, 6, pp. 503–514, 4 fig., 5 graphs, 1958.

In studies at the Colorado Agricultural Experiment Station, Fort Collins, the above-mentioned techniques were used in a comparison of leaf sap samples of 8 strains of sugar beet, both healthy and infected, which differed widely in their apparent reaction to beet yellows. The following conclusions held for leaves of medium age: (1) in zone electrophorograms the main protein fraction in diseased samples moved towards the anode appreciably faster than in healthy; (2) in one-dimensional paper chromatograms, using 40% ethyl alcohol as the solvent, diseased samples were consistently lower in R<sub>f</sub> of the main fraction, but higher in the max. optical density of that fraction and in the amount of D(–) ribose in hydrolysed protein. These trends were most pronounced in leaves of medium age, but were not restricted to them. In two-dimensional paper chromatograms of diseased samples the protein fractions averaged 6.42 and the healthy ones 4.2. These techniques thus show promise as a means of detecting the virus.

STEUDEL (W.). **Versuche zur Übertragung des Vergilbungsvirus (Beta-Virus 4) auf Zuckerrüben mit gestaffelter Individuenzahl des Überträgers Myzodes per-**

**sicae (Sulz.).** [Experiments on the transmission of the yellows virus (*Beta* virus 4) to Sugar Beets with staggered numbers of individuals of *M. persicae*.]—*Zucker*, 11, 23, pp. 538–542, 2 graphs, 1958.

In field trials at Rohrbach, S. Palatinate, Germany, in 1955 and 1956, an increase in the number of viruliferous individuals of *Myzodes* [*Myzus*] *persicae* from 1 to 20/ sugar beet plant was accompanied by a curtailment of the incubation period and an intensification of beet yellows virus symptoms [cf. 38, p. 46], with corresponding reductions in root and sugar yields. The results are discussed in relation, e.g., to chemical control of the vectors [38, p. 45] and the extent of the damage sustained in areas with more or less abundant aphid populations.

SCHULTZ (G.). **Assimilation und Atmung bei Zuckerrüben nach Infektion mit Gelbsucht-Virus (Beet virus yellows).** [Assimilation and respiration in Sugar Beets after infection with Beet yellows virus.]-*Z. Naturf.*, 13 b, 7, pp. 469–471, 1 diag., 1958.

Further information on this work is given [38, p. 45]. The apparent assimilation in a Warburg apparatus (in cu. mm. O<sub>2</sub>/sq. cm. leaf surface) of 2 healthy inner leaves of 2-month-old beet plants was  $33.3 \pm 0.3$  (= 100%) and the corresponding figure for 2 yellows infected but symptomless ones  $29.8 \pm 2.2$  (= 90). At 6 months the assimilation rate of healthy inner leaves was  $12.5 \pm 0.8$  (= 100%) and of infected  $12.6 \pm 1.4$  (= 101). For 3 healthy outer leaves the rates were  $20.2 \pm 1.5$  at 2 months and  $12.3 \pm 1$  at 6 (both = 100%), and for infected with pronounced symptoms  $8.4 \pm 2.1$  (= 42%) and  $-3.2 \pm 1.3$  (= -26%). The assimilation of entire healthy leaves of 2-month-old plants was  $34.3 \pm 1.2$  (= 100%) and that of infected ones  $20.8 \pm 1.5$  (= 61%).

The respiration (in cu. mm. CO<sub>2</sub>/sq. cm. leaf surface) of 6-month-old healthy inner leaves was  $7.3 \pm 0.6$  (= 100%) and infected  $7.1 \pm 0.5$  (= 97), the corresponding levels for outer ones of the same age being  $11.6 \pm 0.5$  (= 100%) and  $17.3 \pm 0.7$  (= 149) and for entire leaves (2 months)  $4.7 \pm 0.8$  (= 100%) and  $5.3 \pm 0.7$  (= 113) [cf. 33, p. 130, *et passim*].

KIM (W. S.). **Studies with several streak-inciting viruses of Pea.**—*Diss. Abstr.*, 18, 6, p. 1932, 1958.

A further account is given of field, greenhouse, and laboratory studies at the University of Wisconsin [38, p. 172] on 5 viruses isolated from pea streak plants. They were all infective on the 16 pea vars. tested. Isolates I-5, M-S, and POV did not infect 14 bean vars. [*Phaseolus vulgaris*], while I-7 and V-3 were highly infective on all. The dilution end point of I-5 in distilled water was  $1/10^7$ , and it was inactivated by 78° C. for 10 min. or by 7 days *in vitro* at room temp.: the corresponding findings for the other 4 were: I-7,  $1/10^6$ , 70°, 7 days; V-3,  $1/10^6$ , 74°, 10 days; M-S,  $1/10^7$ , 64°, 4 days; and POV,  $1/10^6$ , 66°, 4 days.

In general, all 5 produced typical symptoms at 16° and 20°, while inducing severe wilt and abrupt death at 24° and 28°. They were transmitted from pea to pea by the pea aphid [*Acyrtosiphon pisum*] but the min. acquisition periods differed: 15 sec. sufficed for I-5; neither I-7 nor M-S was transmitted after 60–90 min.; V-3 was more readily transmitted after short feeds, and POV after long ones.

In cross protection tests mottled leaves of tobacco and soybean, infected by lucerne mosaic virus (LMV), were protected against infection by I-7. Zinnia plants, inoculated with V-3, developed a systemic mottle, and when inoculated with Price's strain of cucumber mosaic virus did not develop the necrosis seen on leaves inoculated with this virus only. However, V-3 did not protect cowpea against cucumber mosaic virus strain 14 (CMV), CMV did not protect *Nicotiana* spp. against I-7, and V-3 did not protect 3 *Nicotiana* spp. and cowpea against I-7.

The particles of I-5 and M-S were homogeneous, long, uniform rods,  $683 \times 14$

and  $660 \times 11 \mu$ , respectively. Those of I-7 were short rods,  $53 \times 25 \mu$ . Wisconsin pea streak particles were heterogeneous, ranging from short rods to long flexuous fibres, averaging  $528 \times 12 \mu$ . LMV particles were short rods, averaging  $40 \times 22 \mu$ . In conclusion I-7 is accepted as a new strain of LMV.

BROWN (J. C.), HOLMES (R. S.), & TIFFIN (L. O.). **Iron chlorosis in Soybeans as related to the genotype of rootstock.**—*Soil Sci.*, **86**, 2, pp. 75–82, 2 fig., 1 graph, 1958. [19 ref.]

At the Soil and Water Conservation Division, Agricultural Research Service, Beltsville, Maryland, Hawkeye (HA) soybean rootstocks proved to be much more efficient in Fe sorption ( $40 \mu\text{c}$ . radio-iron) than those of PI-54619-5-1 (PI) [cf. **36**, p. 609]. Tops of both vars. were healthy on HA rootstocks but developed chlorosis on PI when grown on a calcareous Quinlan soil.

Grown in a light chamber with a short night (6 hr. dark, 6 light, alternately) HA plants contained slightly more reducing sugar than PI, and organic acid conc. was generally higher in the former. The development of chlorosis in PI was accompanied by an increase in citric acid as compared with a decrease in healthy HA. The conc. of most other organic acids, however, remained higher in HA. The maximum  $\text{C}^{14}$  activity was in the malic acid fraction, especially of HA.

The number and conc. of amino acids appeared to be roughly equal in both vars. at the 1st harvest before PI became chlorotic, asparagine and aspartic acid being the most abundant. An increase in the conc. of these compounds coincided with the development of chlorosis in PI, whereas in the non-chlorotic HA there was a corresponding reduction.

VAN ASSCHE (C.). **Uitbreiding van enkele schimmelziekten op Witloof in België.** [Spread of some fungus diseases on Chicory in Belgium.]—*Agricultura, Louvain*, Sér. 2, **6**, 1, pp. 55–60, 2 fig., 1958. [French, English, and German summaries.]

During the summer and autumn of 1957 *Sclerotinia sclerotiorum* [**17**, p. 293; cf. **34**, p. 204], *Rhizoctonia violaceum* [*Helicobasidium purpureum*: cf. **13**, p. 493], and *Puccinia cichorii* [cf. **5**, p. 275 *et passim*] were widespread.

*S. sclerotiorum* causes heavy damage both in the field and in clamps, the roots being partially or wholly decayed and heading largely prevented. Control measures are primarily prophylactic and include stringent root selection, alternation of forcing-beds, and removal of debris. Soil sterilization by steam kills the mycelium but not the sclerotia. The best of the chemicals tested was brassicol, either dusted on the planted roots or mixed with the covering soil.

*H. purpureum* also attacks the roots and interferes with heading. Here again control should be based on sanitary precautions but tests with hydroxyquinoline gave very promising results. Although covering large areas, *P. cichorii* is less injurious than the other 2 pathogens, since it does not develop until late in the season.

Вовк (А. М.). Огуречный вирус 1, пути его распространения в природе и меры борьбы с ним. [Cucumber virus 1, methods of spread and measures for control.]—*Trud. Inst. genet.*, 1956, 23, pp. 296–310, 1956. [Abs. in *Referat. Zh. Biol.*, 1958, 14, p. 52, 1958.]

Cucumber mosaic virus retained its infectivity on cucurbits and other plants even after passage of infected sap through a Seitz filter or candle filters  $\text{F}_3$  and  $\text{F}_4$ . The main sources of infection are [unspecified] weeds and the aphids *Aphis gossypii*, *Myzus persicae*, and *Macrosiphum gei* [*M. euphorbiae*]. Recommendations for control are given.

RAGIMOV (U. A.). Препараты против мучнистой росы Тыквенных культур. [Compounds against powdery mildew in Cucurbit-growing.]—*Zashch. Rast., Moscow*, [*Plant Prot., Moscow*], 1958, 5, p. 55, 1958.

At the Azerbaijan Agricultural Institute, Kirovabad, U.S.S.R., 0.5% and 1% colloidal S on kaolin (70:30) and 50% thiram at 1 and 2% water suspension, applied when symptoms of powdery mildew [*Erysiphe cichoracearum*: **37**, p. 567] appeared on cucumber, marrow, and melon, gave good control without any leaf scorch, the former giving also increased yields. For melons 0.5% colloidal S on kaolin and 1% thiram twice at a 10–14 day interval was sufficient.

LELLIOT (R. A.). **Angular leaf spot of Cucumber in England.**—*Plant Path.*, 7, 4, p. 132, 1 fig., 1958.

In Sept. 1957 frame-grown cucumbers from Swavesy, Cambridgeshire, developed symptoms resembling those of angular leaf spot (*Pseudomonas lachrymans*) [cf. **37**, p. 197], reported by Ogilvie [cf. **35**, p. 60] to be present occasionally in England. Ten similar isolates of a *Pseudomonas* sp. were obtained from affected material and 2 gave positive inoculation results. A detailed study of the 2 isolates and 2 re-isolates and of American and Danish strains of *P. lachrymans* elicited only minor differences between them and all agreed closely with the published descriptions of the organism.

ADDY (S. K.). **Occurrence of Cercospora malayensis Solh. & Stev. on Abelmoschus esculentus L.**—*Sci. & Cult.*, 24, 2, pp. 95–96, 1958.

This disease on *A. [Hibiscus] esculentus* was severe in Sept. 1957 at the State Agricultural Research Station, Bhubaneswar (Orissa), India [cf. **30**, p. 445].

VAN DER VLIET (M.). **Truffels, een schadelijke schimmel in de Champignonenteelt.** [Truffle, a harmful fungus in the cultivation of Mushrooms.]—*Versl. PlZiekt. Dienst Wageningen* 130, pp. 168–170, 2 fig., 1956.

*Pseudobalsamia microspora* [*Diehlomyces microsporus*] is reported for the 1st time in the Netherlands; measures for prevention and control are outlined [cf. **36**, p. 231].

VUITTENEZ (A.). **Transmission par greffage d'une virose du type 'enroulement foliaire' commune dans les vignobles de l'est et du centre-est de la France.** [Graft transmission of a virosis of the leaf roll type, common in vineyards in east and mid-east France.]—*C. R. Acad. Agric. Fr.*, 44, 6, pp. 313–316, 1958.

In double grafting experiments at the Station de Pathologie Vegetale, Colmar, the symptoms of leaf curl and premature autumnal coloration of the leaves of the vine were transmitted to healthy scions of Pinot noir. It is concluded that the disease is caused by vine leaf roll virus [cf. **37**, p. 389]. Further work will determine its relationship with the 'maladie du Baco' [cf. **33**, p. 53].

HEWITT (W. B.), RASKI (D. J.), & GOHEEN (A. C.). **Nematode vector of soil-borne fanleaf virus of Grapevines.**—*Phytopathology*, 48, 11, pp. 586–595, 3 fig., 1958. [52 ref.]

A more detailed account from the University of California, Davis, of information already noticed [**38**, p. 53]. *Xiphinema index* was shown to be a vector, and other nematodes found present, including *Criconemoides xenoplax*, may also transmit the virus, but further tests are necessary. This is believed to be the first instance of a nematode being proved the vector of a soil borne virus.

STAEHELIN (M.) & BOLAY (A.). **Influence des fongicides organiques sur le développement de l'oidium de la Vigne.** [Influence of organic fungicides on the development of *Oidium* of the Vine.]—*Rev. rom. Agric.*, 14, 5, pp. 39–42, 3 graphs, 1958.

The Stations Fédérales Suisses have decided to limit the use of acupric organic

fungicides to the pre-flowering applications, and to insist on Bordeaux mixture after flowering, in view of observations at Pully, Switzerland, 1953-57, that the replacement of Cu fungicides by organic fungicides against mildew [*Plasmopara viticola*] caused a marked increase in the incidence of oidium [*Uncinula necator*: cf. 38, p. 261].

PHILLIPS (D. H.). **Report of the Mycological Department.**—*Rep. States Jersey, 1957*, pp. 24-33, 1958.

This report [cf. 37, p. 261] notes, *inter alia*, powdery scab (*Spongospora subterranea*) on seed potatoes from Ireland; rust (*Uromyces betae*) on fodder beet and mangold in 1953, on beetroot, a new record for Jersey, and also on *Beta maritima*; and leaf spot (*Ascochyta fabae*) on broad beans and violet root rot (*Helicobasidium purpureum*) [map 275] on carrots, both new for Jersey. The most important diseases of anemone were grey mould (*Botrytis cinerea*) [cf. 35, p. 299] and downy mildew (*Peronospora ficariae*) [29, p. 305]. The latter was a new record for the island as was *Fusarium oxysporum* f. *gladioli* on gladioli. Leaf spot (*Heterosporium gracile*) [*Mycosphaerella macrospora*] was very severe on outdoor irises, and bulb rot, predominantly *Penicillium corymbiferum*, common on iris bulbs [cf. 37, p. 538]. *Sclerotinia narcissicola* [map 315] was recorded for the 1st time on narcissus, also affected by stripe (narcissus mosaic virus) [cf. 37, p. 44] and basal rot (*F. oxysporum* f. *narcissi* [*F. bulbigenum*]). *Puccinia arenariae* occurred on *Dianthus barbatus* [cf. 33, p. 523], and *Botrytis tulipae* [map 170] on tulips.

In further investigations of tomato stem rot (*Didymella lycopersici*) [cf. 37, p. 5] it was found that composting the haulms reduced losses. The fungus could not be spore-trapped in late June or in July; stem inoculation indicated that no stem rotting forms occur before Sept. Zineb, lirozate, and phelan were no more effective as sprays than Cu; maneb proved slightly better, but not significantly so.

ЗАКОРАЛ (J.). Использование новых данных нашего научного исследования по защита растений для повышения урожая с гектара. [The use of new data from our scientific investigations on plant protection for the increase of yield per hectare.]—За соц. сел.-хоз. науку (*Social. agric. Sci.*, Prague), Ser. A, 7, 3, pp. 209-226, 1958. [German translation.]

A new laboratory test method to establish resistance to wart (*Synchytrium endobioticum*) in new potato hybrids described from the Research Institute for Plant Production, Ruzyne, Czechoslovakia, makes it possible to check 10,000-15,000 tubers rapidly. To eliminate individual foci of wart, the soil is sprayed or dusted with the sodium DNOC salt of an organic dye at 8-10 kg./ha. In the following years truck crops (not potatoes) or other plants necessitating systematic cultivation, especially watering which will contribute to the elimination of the resting spores, should be grown on the ground.

In 1955 small field plots were used to test the prolonged immersion (48 hr. or more) of barley in a suspension of chloranil or other substances for the elimination of smut (*Ustilago nuda*). At 0.05% chloranil gave almost 100% success. An advantage is that disinfection is carried out at laboratory temp., but there is difficulty in drying the seed. In further tests some of a large number of substances proved more successful than chloranil, for instance tetrachlorohydroquinone *o*-aminophenol, pyrocatechin, and protocatechenic acid. As prolonged immersion would be difficult under farming conditions a completely new anaerobic disinfection method has been developed. The barley is either steeped for 4 hr. in an aqueous suspension of the fungicide at room temp. (20-22° C.) or moistened with 20 l./dz. The moistened seed is placed in an air-tight container, again at 20-22°, and finally dried to its original weight. Tests on small plots showed 100% control or nearly so.

KAAREP (E.). **Eesti NSV-s ilmnenud uusi taimehaigusi.** [New plant diseases in the Estonian S.S.R.]—*Bull. Tead. tehn. inform., Tallin, 1957*, 1, pp. 19–24, 3 fig., 1957. [Russian summary. Received Dec. 1958.]

Investigations by the Estonian Research Institute for Agriculture and Development showed that in recent years, owing to the increased movement of grain, seeds, and plants, new diseases had been noticed in Estonia. Root rot (*Colletotrichum atramentarium*) of tomatoes [cf. **25**, p. 329], though localized around Tallin, is very severe; tobacco mosaic virus on tomatoes is present throughout Estonia; green blotch on tomatoes [cf. **37**, p. 633], especially the Talalikhin var., is caused by the high salt content of the soil. Onion yellow dwarf virus [cf. **36**, p. 567; map 46], newly recorded for the country, has spread rapidly on onion and garlic; rust (*Puccinia phragmitis*) [cf. **6**, p. 336] on rhubarb (1st record 1956) is not severe, but *Peronospora jaapiiana* [cf. **30**, p. 22] caused complete loss of rhubarb leaves in Khar'yensk province, though it has not been noticed elsewhere. The virus causing wiriness of tomato leaves has not been identified; the damage is extensive, the flowers wither, with a marked decrease of fruit production. Seed and plant material of the above-mentioned crops are now largely subject to quarantine measures.

**Current research and investigation.**—*Orchard. N.Z.*, **31**, 10, pp. 307–309, 1958.

As shown by a new method of measuring the effectiveness of fungicides in soil, described from the Plant Diseases Division and Fruit Research Station, involving the culturing of samples of soils which had received different chemical treatments, *Pythium* [**37**, p. 90] and *Phytophthora* [**37**, p. 287] spp. declined markedly after application of copper oxychloride, while *Penicillium* spp. increased, but the effect of the treatment on apple tree roots is not yet known.

Plum mosaic [plum line pattern: **36**, p. 567] virus, which reduced considerably the crop of infected plum trees in the Doris yield trial at Oratia, has been transmitted to roses [cf. **35**, p. 892], on which it caused pronounced mottling, distortion, and stunting of leaves, and a general reduction in vigour. It is suggested that different strains of the virus exist in the field and that weaker strains protect trees from infection by the severe ones; though it did not eliminate the virus completely from infected Santa Rosa plum, heat treatment reduced considerably the percentage of leaves showing symptoms.

At Roxburgh, soil application of Fe chelate at  $\frac{1}{2}$  lb./tree eliminated deficiency symptoms in apple only in the year of application [**37**, p. 359]. Lime-sulphur (1:30) followed by sulfane (2 lb.) and then karathane (1 lb.) was much superior to the standard S programme in the control of powdery mildew [*Podosphaera leucotricha*: loc. cit.] in a 3 yr. trial on Jonathan; the fruit had a superior finish and colour; replacing lime-S with colloidal S from open cluster to fruit cover seriously reduced the effectiveness of the standard S programme.

LEDINGHAM (G. A.) & BLACKWOOD (A. C.). **Review of industrial microbiology in British Commonwealth countries.**—v+158 pp., London, H.M. Stationery Office, 1958. 10s.

This report is based on information obtained from Australia, E. and W. Canada, India, New Zealand, Pakistan, S. Africa, the United Kingdom, and from a representative of the Colonies. Major emphasis is placed on investigations in which an organism plays the primary role in the production of some definite chemical compound. In general, problems relating to soil microbiology, plant and animal diseases, and public health are omitted. Industries and research institutions were approached and the institutions and their scientific staffs and research projects were listed for each country (Appendix I). Except for the United Kingdom, a complete list of papers published during 1946–52 (and some later) is presented in Appendix II under the headings: (1) industrial chemicals; (2) pharmaceuticals;

(3) enzymes; (4) foods, feeds, and beverages; (5) preservation of materials; and (6) miscellaneous. The results of the survey are summarized under the first 5 of these headings. It is noted that much more work is in progress in these fields in the United States alone than in all the Commonwealth countries together, and *inter alia* the establishment of a Commonwealth centre for antibiotic-producing cultures is suggested.

CIFERRI (R.) & PAOLI (G.). **Malattie e parassiti delle piante agrarie. Manuale ad uso degli istituti tecnici agrari. Seconda edizione aggiornata da R. CIFERRI.** [Diseases and pests of agricultural plants. A manual for the use of agricultural technical institutes. Second edition, brought up to date by R. CIFERRI.]—xi+538 pp., 131+164 fig., Rome, Società Editrice Dante Alighieri (Albrighi Segatie C.), 1958. L. 1,600.

The 1st part of this useful work (pp. 3–283), by Ciferri, covers diseases. It consists of 7 parts dealing with general aspects of the subject, including the concept of disease, ecological, climatic, and related soil conditions, classification, susceptibility, resistance and immunity, symbiosis, spread, control (with reference to various types of fungicide and to seed and soil treatment), the symptoms of disease in plants, non-parasitic diseases, and virus, bacterial, and fungal diseases, illustrated by accounts of well-known examples in each category and in each class of fungi. Algae and lichens are noted in short appendices and there is a brief account of some parasitic phanerogams.

MANIGAULT (P.) & STOLL (C.). **The role of nucleic acids in crown-gall tumor induction.**—*Experientia*, **14**, 11, pp. 409–410, 1958. [German summary.]

Further experiments with the bacteria-free tumour-inducing principle (TIP) [36, p. 178], using *Datura stramonium* as a test plant, confirmed results already obtained. It was demonstrated that TIP did not develop when a deoxyribonuclease was added either before or after a 2-day incubation period at 27° C. to a mixture of a suspension of *Agrobacterium tumefaciens* and sap from plants wounded 48 hr. previously. It is concluded that the induction of crown gall by the bacterium is a function of the nucleic acids and very probably of deoxyribonucleic acid. TIP cannot, however, be identical with the nucleic acids, since their infiltration did not give rise to tumour formation. It is suggested that an important protein fraction of the 'wound juice' is modified by the nucleic acid in such a way as to develop into TIP.

RIEGERT (A.). **Milieu de culture pour *Agrobacterium tumefaciens*.** [Culture medium for *A. tumefaciens*.]—*Experientia*, **14**, 12, p. 465, 1958. [English summary.]

At the Institut de Pharmacologie et de Médecine Expérimentale, Faculté de Médecine de Strasbourg, France, *A. tumefaciens* made better growth on the following medium, specially prepared to meet its nutritional requirements, than on those in current use: 1,000 ml. water, 0.5 g.  $\text{KH}_2\text{PO}_4$ , 0.2 g.  $\text{K}_2\text{HPO}_4$ , 0.25 g.  $\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$ , 0.2 g.  $(\text{NH}_4)_2\text{SO}_4$ , 10 g. glucose, and 0.2 ml. of a modified Berthelot's oligodynamic solution (*Rev. gén. Bot.*, **62**, p. 499, 1955).

JOHNSTON (A.). **A note on fungicidal seed dressing of Soya Bean, Groundnut and Long Bean.**—*Malay. agric. J.*, **41**, 3, pp. 152–155, 1 pl., 1958.

Preliminary experiments at the Federal Experiment Station, Serdang, Malaya, with several fungicidal seed dressings for soybean, groundnut, and long bean (*Vigna sinensis*) resulted in as much as 53% increase of germination in the 1st and 33% in the 2nd, though the long beans did not benefit much.

KOLE (A. P.) & TCHONG (L. H. W.). **Een methode voor vergelijkend onderzoek over de integrale werking en de dampwerking van droge en natte zaad-**

**ontsmettingsmiddelen.** [A method for the comparative study of the integral action and the vapour action of dry and wet seed disinfectants.]—*Tijdschr. PlZiekt.*, **64**, 4, pp. 297–300, 1 fig., 1958.

At the Laboratorium voor Phytopathologie, Landbouwhogeschool, Wageningen, fungicides are examined for their overall action by placing impregnated paper strips on the surface of potato dextrose agar mixed with a conidial suspension of *Glomerella cingulata*, the width of the inhibition zone being measured after 3 days at 23° C. If the vapour action alone is to be measured a piece of glass the same size as the strip is placed between the paper and the agar.

ALEXANDER (P. M.). **Movement of a fungicide, cyano (methylmercuri) guanidine, in sand and in soil.**—*Diss. Abstr.*, **19**, 2, p. 215, 1958.

In studies at Ohio State University the active ingredient of this fungicide readily penetrated sand and soil columns 6–30 in. deep, but was leached more rapidly from soil than from sand.

A modified agar plate paper-disk bioassay was developed, the fungicide or fungicide-containing leachate being added to the agar and 0.03 ml. of a conidial suspension of *Aspergillus niger* being placed on each paper disk; the colony diam. of the fungus was then measured. The method is 100 times more sensitive than the usual method in these conditions, and is recommended for further investigations of soil fungicides.

Water leachates from 30 in. sand and soil columns were checked for the presence of any material(s) which might influence the growth of *A. niger*. A growth-promoting substance was found in the water leachates from soil columns, but not in those from sand. The soil used had a large population of spore-forming bacteria which could withstand prolonged exposure to high temperatures (124° C.).

MUNNECKE (D. E.). **The persistence of nonvolatile diffusible fungicides in soil.**—*Phytopathology*, **48**, 11, pp. 581–585, 3 graphs, 1958.

At the University of California, Los Angeles, 20 ml. of either captan 50-W, dithane D-14 (19% nabam), semesan, or fermate (76% ferbam), each at 1,000 p.p.m. active ingredient, were added to flasks containing 30 g. of a mixture of equal parts of peat moss and fine sand, with added N, P, K, and lime, and steamed, sterilized with propylene oxide, or left untreated. Samples were then bioassayed for fungicidal activity [37, p. 449] at intervals up to 150 days. Nabam lost activity in the first few hr., apparently due primarily to chemical changes, which were accelerated in soil and most marked in that treated with propylene oxide, possibly associated with its comparatively high pH (initially 6.4). Ferbam behaved similarly, though it was rather more stable, and again parallel results in sterile and non-sterile soil suggested that physico-chemical factors were responsible [cf. 33, p. 754]. Semesan was rapidly inactivated in non-sterile soil, none being detected in one experiment after 10 days, and also more slowly inactivated by a non-biological factor. Captan proved stable under all treatments.

SMALE (B. C.). **Effects of certain trace metals on the fungitoxicity of sodium dimethyldithiocarbamate.**—*Diss. Abstr.*, **18**, 2, pp. 374–375, 1958.

It was concluded from experiments at the University of Maryland that Zn was the critical metal involved in the toxicity of low conc. of dimethyldithiocarbamate [38, p. 124], using *Saccharomyces pastorianus* grown in liquid medium deficient in trace elements as the test fungus, and that it must be closely associated with the fungus and not merely present in the medium. At first a 1:1 complex is formed, then with increasing conc. a non-toxic 1:2 complex.

VAN ANDEL (O. M.). **Investigations on plant chemotherapy II. Influence of amino acids on the relation plant—pathogen.**—*Tijdschr. PlZiekt*, **64**, 4, pp. 307–327, 2 pl., 1958. [Dutch summary. 28 ref.]

In further studies at the Laboratory of Phytopathology, Wageningen [cf. **36**, p. 910], 7–10-day seedlings of the cucumber var. Lange gele Tros, raised in sterile sand, were placed for 2 days with their roots in an aqueous solution of an amino acid, rinsed, transferred to water, and sprayed with a conidial suspension of *Cladosporium cucumerinum*. Infections were indexed on a scale 0 (healthy)–6 (heavily infected) by examination of the lesions on the hypocotyl after 5–7 days at 18–20° C. Older plants, grown in soil, were used in some tests. Most of the amino acids tested were without effect, but DL-serine, DL-threonine, L-threo- $\beta$ -phenylserine, and DL-histidine markedly increased plant resistance. The effect was yet more marked when these acids were applied in combination with a thio- or dithiocarbamate fungicide, glycine and DL- $\alpha$ -alanine being active only in such combinations. In seedlings the protection could be maintained for about 1 week. It proved immaterial whether the compounds were applied to the roots, cotyledons, or leaves, and even with treatment 24 hr. after inoculation a considerable protective effect could be demonstrated.

In similar experiments broad bean plants were likewise protected against *Botrytis fabae* and tomato against *Phytophthora infestans* by DL-serine and to a lesser extent by some amino acids. *In vitro*, D-serine at 0.4% prevented growth of *C. cucumerinum* at 23° on agar containing glucose, yeast extract, and inorganic salts: at 0.05% there was little effect on mycelial growth but sporulation was limited. DL-serine was not toxic at the concs. tested. An inhibitory effect was detected in some experiments with sap from plants treated with DL-serine or with fungicide-amino acid mixtures, the effect of the latter being greater than that of sap from plants supplied with fungicide alone.

SLAVÉNAS (J.). **Sinapis alba ir Brassica juncea fitoncidų praktinio paraudojimo klausimu.** [On the question of the practical use of the phytoncides of *S. alba* and *B. juncea*.]—*Darb. Akad. Moks. Liet. T.S.R.*, 1958, Ser. B, 2 (14), pp. 183–196, 1958. [Russian summary.]

In studies at the Biological Institute, Vilnius, Lithuania, the max. of phytocidal substance in *S. alba* occurred at the pod formation stage, and in Chinese mustard (*B. juncea*) at flowering. Distillates from the seeds of *B. juncea* checked the growth of *Fusarium poae*, *F. culmorum*, *F. sporotrichioides*, *F. oxysporum*, *Botrytis cinerea*, *Cladosporium epiphyllum*, *Helminthosporium cynodonticola*, and *Aspergillus niger* and also spore germination of *Ustilago panici-miliacei* [*Sphacelotheca destruens*], *Alternaria tenuis*, *B. cinerea*, *F. poae*, *F. sporotrichioides*, *F. culmorum*, and other fungi, but those of *S. alba* had a negligible effect. Higher concs. of the phytoncides had an inhibitory effect on the germination of the Džiugin barley, Gražuciu wheat, Greitukų pea, and Kazan proso millet [*Panicum miliaceum*]. Cake meal made of Chinese mustard seed after extraction of the rich oils was the best inhibitor of plant pathogens.

HIGGINS (E. S.). **Inhibition of *Aspergillus niger* growth by m-dinitrobenzene and its reversal by amino acids.**—*Proc. Soc. exp. Biol.*, N.Y., **99**, 2, pp. 527–530, 1 graph, 1958.

At the Medical College of Virginia, Richmond, the growth of *A. niger* was inhibited by the addition of DNB at  $2.5 \times 10^{-5}$  M to the mineral culture medium at any time up to 30 hr. incubation. A similar effect was exerted on unidentified strains of *Penicillium*, *Alternaria*, and *Hormodendrum*. The fungistatic action of DNB was reversible when synthetic mixtures of amino acids were incorporated in the medium. It was further shown that nitroaryl compounds can be reduced to relatively non-

toxic arylamines by a sulphhydryl-dependent, pyridine nucleotide-linked enzyme from *Aspergillus niger*, suggesting a potential method of detoxication for the mould.

LEASURE (J. K.) & FALKENSTEIN (J. W.). **A logarithmic concentration sprayer for small plot use.**—*Down to Earth*, **14**, 3, pp. 2–5, 2 fig., 3 diag., 7 graphs, 1958.

After a discussion of the principles on which a logarithmic concentration sprayer works (cf. *Nature*, **176**, p. 472, 1955) the authors describe a versatile small plot sprayer of this type, constructed at the Dow Chemical Company, Midland, Michigan, and tested in the field in 1956. It is concluded that the machine is very useful where rates are to be determined, where the effects of additives or of combinations are to be studied, or similar material compared.

МОРОШКОВСКИЙ (S. F.). История микробиологических исследований на Украине и связь их с Русской микологической наукой. [The history of microbiological research in the Ukraine and its connexion with Russian mycological science.]—*Bot. Zh. S.S.S.R.*, **43**, 7, pp. 1057–1065, 1958. [2 pp. ref.]

A historical review covering the past century.

SAAD (S. I.). **Studies in atmospheric pollen grains and fungus spores at Alexandria. II. Pollen and spore deposition in relation to weather conditions and diurnal variation in the incidence of pollen.**—*Egypt. J. Bot.*, **1**, 1, pp. 63–79, 4 graphs, 1958. [Arabic summary.]

Observations with gravity slides at Alexandria University in 1954–56 indicated a parallel periodicity between pollen and spore depositions, which reach their max. during Mar. and Apr. In addition to the common moulds *Mucor*, *Aspergillus*, *Penicillium*, and yeasts, spores of rusts, smuts, *Alternaria*, *Helminthosporium*, and *Stemphylium* were recorded in the atmosphere of Alexandria.

KUEHNER (C. C.). **The use of amylolytic yeasts for the production of a nutritional product.**—*Diss. Abstr.*, **18**, 6, p. 1956, 1958.

At the Ohio State University, *Endomycopsis fibuliger* and *E. chodati* were tested for their ability to form the basis of preparations made directly from amylaceous substrates (mashes of wheat, maize, rice, and sweet and white potatoes). In some of the trials *Torulopsis utilis* was cultured in mixed populations with one of the two. The net yield of synthesized protein depended on the rate of agitation. Amylase-containing filtrates of *A. niger*, or living cultures of it with *C. utilis* gave higher protein yields but poorer solids yields than *E. fibuliger* and *E. chodati*. *Hansenula subpelliculosa*, tolerant of higher osmotic pressures, may be better than *C. utilis* in continuously operated processes. A propagation time of 8 hr. gave opt. yields of solid and protein.

ROY (H. K.). **Oxidation-reduction potential as an important instrument in biological studies and biological plant control.**—*Sci. & Cult.*, **24**, 1, pp. 4–7, 1958.

A review from the Water Works Laboratory, Calcutta, of this subject, its mechanism and measurement, significance in the cell, and its applicability.

LICCIARDELLO (G.) & FICHERA (P.). **Appunti sul metabolismo di alcuni carboidrati in *Deuterophoma tracheiphila* Petri.** [Notes on the metabolism of some carbohydrates in *D. tracheiphila*.]—*Ann. Sper. agr.*, N.S., **12**, 4, pp. 1095–1102, 1958. [English summary.]

Describes studies at the University of Catania, Sicily, on the metabolism of glucose and ribose in *D. tracheiphila*.

SURYANARAYANAN (S.). **Growth factor requirements of *Piricularia* spp. and *Sclerotium oryzae*.**—*Proc. Indian Acad. Sci.*, Sect B, **48**, 4, pp. 154–188, 1 pl., 8 graphs, 1958. [46 ref.]

In further work at the University of Madras [38, p. 184], *P. oryzae*, *P. setariae*, *P. zingiberi*, *P. spp.* on *Eleusine coracana*, wheat, and *Brachiaria mutica*, and *S. oryzae* all exhibited total heterotrophy for vitamins. All spp. and isolates of *P.* had a deficiency for both thiamine and biotin, while *S. oryzae* had a deficiency for thiamine. Under the cultural conditions employed the opt. vitamin levels were about 1  $\mu$ g. thiamine and 0.01  $\mu$ g. biotin/250 ml. flask for *P. spp.*, and 1  $\mu$ g. thiamine for *S. oryzae*. Heterotrophy for the vitamins was uninfluenced by N and C sources over a range of pH, and was therefore considered to be absolute. There was no correlation between vitamin requirements and virulence. The *P. spp.* did not utilize ammonium N. *S. oryzae* utilized ammonium N, inorganic and organic N, but the 1st did not favour the production of sclerotia; this unsuitability of ammonium N was not due to a conditioned deficiency of pyridoxine or inositol. A variety of C sources were utilized.

HIRATA (S.). **Studies on the phytohormone in the malformed portion of the diseased plants. 4. Production of auxin by the fungi, *Fusarium* sp., and growth promotion of Rice seedlings by their culture filtrates.**—*Bull. Fac. Agric. Univ. Miyazaki*, **3**, 1–2, pp. 46–52, 1 graph, 1958. [Japanese. Abs. from English summary.]

In further studies [37, p. 761] on the auxin formation by 42 strains of *Fusarium* sp. grown for 30 days at 23° C. on potato agar, only *F. oxysporum* f. *vasinfectum* failed to produce free auxin, though there was no correlation between the quantity of auxin and growth rate or other behaviour of the colonies. When cultured on Czapek's medium at 26° for 20 days, especially when L-tryptophane was substituted for KNO<sub>3</sub>, strains of *Fusarium* and *Gibberella* spp., particularly *F. o. f. vasinfectum*, produced auxin. A substance, possibly gibberellin, isolated from potato liquid medium on which 24 strains of *F. solani* had been grown for 25 days at 23° caused abnormal growth promotion in rice seedlings.

NAITO (N.) & KOJIMA (Y.). **Fungitoxic substance production by *Gloeosporium olivarum* which was grown on media containing either 2-chlorophenoxyacetic acid or 2-methylphenoxyacetic acid.**—*Tech. Bull. Fac. Agric. Kagawa Univ.*, **9**, 1 (24), pp. 18–25, 7 graphs, 1958. [Japanese. Abs. from English summary.]

At the Kagawa University, Japan, the growth of *G. olivarum* [37, p. 760] on peptone-salts agar containing either 2-chlorophenoxyacetic acid (CPA) or 2-methylphenoxyacetic acid (MPA) showed a progressive decrease in rate corresponding to an increased inhibitory activity of either chemical. Media containing 2-methylphenol (MP), 2-chlorophenol (CP), or 2-dichlorophenol (DCP) induced a progressively increasing growth rate. Staling growth was produced in the presence of either CPA or MPA, but not MP, CP, or DCP. The presence of the first 2 in the medium induced the formation by the fungus of a certain fungitoxic yellowish oil [loc. cit.].

MISATO (T.), ASAKAWA (M.), & FUKUNAGA (K.). **Translocation of antibiotics in plants. (1) Effect of plant tissue on the assays of some antibiotics and translocation of them in Broad Bean.**—*Ann. phytopath. Soc. Japan*, **23**, 2, pp. 97–101, 3 graphs, 1958. [Japanese. Abs. from English summary.]

At the National Institute of Agricultural Sciences, Nishigahara, Kita-ku, Tokyo, antimycin A was detected at 0.01  $\mu$ g./ml., blasticidin at 0.05, and blastmycin at 0.003 by assaying against spores of *Piricularia oryzae* [37, p. 759]. Leaf sap from untreated tomato plants inhibited growth of *P. oryzae*, whereas that from rice

and broad bean stimulated it; methanol extracts from leaves of all 3 plants produced inhibition zones. The antibiotic activity of blasticidin was less in broad bean extract than in pH 5 buffer solution, no such difference being noted with rice or tomato. The activity of antimycin A and blastmycin was less in rice extracts (but not tomato or bean) than in methanol. Antibiotics were detected in the leaves of broad bean plants after absorption from solutions via the cut stems, but not in root-treated plants.

ALTMAN (J.). **Studies on the control of plant diseases with antibiotics, with particular reference to streptomycin.**—*Diss. Abstr.*, 19, 2, p. 201, 1958.

In this study at Rutgers University, bacterial leaf spot [*Xanthomonas vesicatoria*: cf. 36, pp. 161, 603] of capsicum was significantly reduced by streptomycin sprays and dusts in both inoculated and naturally infected plants, the best being a 200 p.p.m. spray with added tween 20 at 2 oz./100 gal. and 1% methyl cellosolve, and a 5,000 p.p.m. dust + 3% metallic Cu. Of all the plant species studied, capsicum was the most tolerant of streptomycin sprays. When applied to the roots, streptomycin was detected in the tops 7 weeks later.

On potato seed-pieces inoculated with *Fusarium* sp. and *E[ruwinia] atrosepatica* [cf. 36, pp. 348, 786], streptomycin in combination with catechol and captan, dip or dust, and mycostatin + streptomycin dip gave the greatest increases in stand, height, and yield over the inoculated, untreated pieces. Halo blight [*Pseudomonas medicaginis* f. sp. *phaseolicola*] of beans [*Phaseolus vulgaris*] was reduced in severity by 3 sprays of 200 or 400 p.p.m. of streptomycin [cf. 36, p. 81], pod infection being reduced more considerably than foliage infection. Bacterial spot [*Pseudomonas syringae*] of Lima bean [*Phaseolus lunatus*] was rendered less severe by 3 sprays of 200 p.p.m. of streptomycin with or without 1% glycerol [cf. 36, pp. 770, 806, 816, *et passim*], which did not improve the degree of control. Streptomycin at 50 and 100 p.p.m., alone or plus 1% glycerol, significantly reduced broccoli downy mildew [*Peronospora parasitica*: cf. 36, p. 676]; sprays at 100 p.p.m. or more injured the foliage. Manganese (2.5 p.p.m.) and EDTA (6.7 p.p.m.) reduced the toxic effects of streptomycin (200 p.p.m.) on beans [*Phaseolus vulgaris*] growing in solution cultures [cf. 36, p. 481].

MÜLLER (K. O.). **Studies on phytoalexins. I. The formation and the immunological significance of phytoalexin produced by *Phaseolus vulgaris* in response to infections with *Sclerotinia fruticola* and *Phytophthora infestans*.**

JEROME (S. M. R.) & MÜLLER (K. O.). **Studies on phytoalexins. II. Influence of temperature on resistance of *Phaseolus vulgaris* towards *Sclerotinia fruticola* with reference to phytoalexin output.**—*Aust. J. biol. Sci.*, 2, 3, pp. 275–300, 2 pl., 3 graphs; pp. 303–314, 2 pl., 4 graphs, 1958. [54 ref.]

In the 1st part of this expanded account of investigations at the Division of Plant Industry, Canberra, into the antibiotic factor (phytoalexin) present in infected plant tissues [36, p. 49], the author states that when the inner epidermis of *P. vulgaris* pods was used as a host tissue and *S. fruticola* and *Phytophthora infestans* were employed as pathogens a principle (or principles) was separated from the host which strongly inhibited the growth of the parasites. This principle occurred in amounts which totally inhibited the growth of the parasite. It was not specific, and it possessed properties which clearly showed it to be an individual chemical factor or factors. Antibiotic activity was not influenced by chemical factors in the host tissues which may serve as nutrients to the pathogen. Within a range of 4–7.5 the pH had neither an antagonistic nor a synergistic effect on the inhibitory principle. There was a strong adsorption of the active principle on non-parasitized cells. The output/unit vol. of parasitized tissue [37, p. 645] depended on the age of the host tissue.

Six other host-pathogen combinations interacting in a hypersensitive manner (pea, broad bean, and *Capsicum annuum* and the same 2 fungi) were ascertained to produce (after infection) inhibitory principles which arrested the growth of the pathogen.

Emphasis is laid on the view that in the cases studied 'resistance' is preconditioned by the ability of the host tissue to meet the metabolic activities of the pathogen with the accumulation round the infection sites of phytoalexin.

In the 2nd part, the authors show that the resistance of pods of *Phaseolus vulgaris* to *S. fructicola* and *Botrytis cinerea* is affected by the temp. of the environment before inoculation. At the critical temp. of 44° C. for 2 hr. the loss of resistance is reversible. Recovery occurs within 3 days when the material is stored at 20°. The output of phytoalexin is also affected by pre-inoculation conditioning at various temps., and there is always a close correlation between the clinical behaviour of the pods and the production of the antibiotic. The respiration rate, as shown by O uptake in air, is affected by preconditioning treatment with high, non-lethal temps. No direct correlation could be established between the O uptake and the clinical behaviour or phytoalexin output.

PETRUKOVICH (S. U.). К дискуссии о роли силикатных бактерий. [Discussion on the role of silicate bacteria.]—*Zashch. Rast., Moscow [Plant Prot., Moscow]*, 1958, 5, pp. 27–29, 1958.

In the Uman' and Man'kov districts, Cherkassy region, Ukraine, silicate bacteria, introduced into the soil before planting, increased the yield of Perkenets 190 tomato, and even that of early vars., though the decrease in top rot [unspecified] was very little. Tests with winter wheat and maize gave negative results.

POSPELOV (A. G.), ZAPROMETOV (N. G.), & DOMASHEVA (Мме А. А.). Грибная флора Киргизской ССР. Выпуск I. [Fungus flora of the Kirgiz S.S.R. Part 1.]—129 pp., Kirgiz Academy of Science, Frunze, 1957. Roubles 7.55. [24 ref. Received 1959.]

This list, compiled by the Botanical Institute of the Kirgiz Academy of Science, of 874 fungi of all groups includes 3 new spp. and 4 new forms, which are fully described, and gives the hosts and place records in Kirgiz S.S.R. *Helminthosporium astragali* Zaprometov occurs on the leaves of *Astragalus sieversianus*. There are alphabetical indexes of parasites and hosts.

SCHMIEDEKNECHT (M.). **Morphologische Untersuchungen zur Frage der Rassenbildung bei *Helminthosporium papaveris* Saw.** [Morphological studies on the question of strain formation in *H. papaveris*.]—*Arch. Mikrobiol.*, 28, 4, pp. 404–416, 5 fig., 1 graph, 1958.

Nearly 170 single spore isolates of *H. papaveris* (*Pleospora papaveracea*) [31, p. 257; 38, p. 186] from seeds and infected parts of *Papaver* spp. and vars. from 12 European countries were made at the Institut für Allgemeine Botanik, Friedrich Schiller University, Jena, Germany. The fungus was mainly located in the transverse and reticular cells of the testa. A number of strains, clearly distinguishable by the nature and amount of mycelial growth, zoning, formation of pigment, size of conidia, and tendency to sector and spot variations, were detected. Differences in conidial length were statistically significant. The nature of the medium greatly influences the manifestation of the characteristics of the individual strains. Zoning depends on the day-night rhythm. Many strains are stable, some very unstable. Ripe ascospores were secured in culture on sterilized poppy stems overwintered in the laboratory. They were produced in pseudothecia developed from sclerotia. New strains deriving from ascospores in culture were secured.

BANERJEE (S.) & SARKAR (A.). **Studies on heterothallism. IV. *Ganoderma lucidum* (Leyss.) Karst.**—*Sci. & Cult.*, **24**, 4, pp. 193–195, 2 fig., 1958.

Studies at the University College of Science, Calcutta, of polyspore cultures of *G. lucidum* from various hosts revealed clamp-connexions which were completely absent from monospore cultures. Sixteen such monospore cultures from a single sporophore on *Swietenia mahagoni*, in the Botanic Garden, Calcutta, paired in all combinations on malt agar, showed the fungus to be heterothallic and tetrapolar, but with only 3 of the 4 groups present. Compatible, antagonistic, and intermediate reaction types were recognized visually.

RANGASWAMI (G.). **An agar block technique for isolating soil micro-organisms with special reference to pythiaceous fungi.**—*Sci. & Cult.*, **24**, 2, p. 85, 1 fig., 1958.

The device used at the Annamalai University, Madras, is made from a glass rod,  $\frac{1}{2}$ – $\frac{3}{4}$  cm. in diam., bent into a rectangular matrix  $9 \times 3$  cm. It is filled with melted agar and when set, the matrix with the agar block is buried in the soil. After a while the soil is scraped off with a sterile scalpel and bits of the agar with bacterial or fungal colonies are plated out. By increasing the length of the matrix it is possible to isolate organisms at various depths. The max. number of pythiaceous fungi was obtained when oatmeal agar blocks were left in the soil for 12–48 hr.

ISAAC (P. K.). **A haematoxylin staining mountant for micro-organisms.**—*Stain Tech.*, **33**, 6, pp. 261–264, 1958.

Directions are given for the preparation and application of a medium which has proved useful for staining delicate filamentous fungi and algae at the Dept of Botany, University of Manitoba, Winnipeg, Canada. It consists of 50 ml. distilled water, 10 ml. formic acid (85–90%), 20 g. gum arabic, 0.5 g. haematoxylin, 1.5 g. ferric alum, 0.5 g. chrome alum, 0.15 g. Bismarck brown, 20 ml. glycerol, 30 g. chloral hydrate, and excess methyl green added to a 10 ml. aliquot of the prepared medium. The initial reddish-purple colour of the stained material gradually changes to a dense blue-black with the evaporation of the formic acid in the preparation. Mounts made by this method possess a high degree of permanence, no signs of deterioration having appeared after 2 yr. of storage in the laboratory.

KUVSHINOVA (Mme E. V.). Применение сухих сывороток в фитопатологии. [The use of dry sera in phytopathology.]—*Proc. Timiryazev agric. Acad.*, **31**, pp. 162–166, 1957. [Received 1959.]

The technique used at the Plant Protection Station of the Timiryazev Agricultural Academy to simplify the analysis and improve the storage of antiviral and antibacterial sera was to freeze them at  $-35$  to  $-40^{\circ}$  C. and then vacuum dry. The serum must be prepared in distilled water and diluted with 1% glucose, which aids preservation for up to 8 months. Dry sera are easier to keep at room temp. for long periods and are especially convenient for treating seeds against seed-borne diseases.

LIMASSET (P.). **Les virus et les maladies à virus des plantes.** [Viruses and the virus diseases of plants.]—*Ann. pharm. franç.*, **16**, 3, pp. 205–216, 1958.

A summary of up-to-date information on the essential features of viroses; the properties and purification of viruses; chemical constitution and structure of the particles; multiplication in the host; identification and transmission; and control measures.

SOMMEREYNS (G.). **Techniques de préparation des virus végétaux en microscopie électronique.** [Methods for the preparation of plant viruses in electron microscopy.]—*Parasitica*, **14**, 2, pp. 49–57, 3 fig., 1958. [12 ref.]

Methods of freeing plant viruses from the impurities associated with them within

the plant prior to examination by the electron microscope are briefly described: these comprise precipitation, freezing, ultracentrifugation, chromatography, and exudation. The results obtained with various viruses are discussed.

ROLAND (G.). **Sur les virus des plantes identifiés en Belgique.** [On the plant viruses identified in Belgium.]—*Parasitica*, **14**, 4, pp. 148–158, 1958.

In this address, given in Brussels on 11 June 1958, the author, after a brief historical introduction, notes the characteristics of the viruses found in plants in Belgium under hosts (large-scale crops, market-garden crops, ornamental plants, fruit trees, and general), the characteristics and host families also being tabulated according to the names of the viruses. So far 38 plant viruses have been recorded in Belgium.

SĂVULESCU (A.) & POP (I.). **Contributions à l'étude de la virose 'stolbur' en Roumanie.** [Contributions to the study of stolbur virus in Romania.]—*Rev. Biol., Bucharest*, **2**, 1, pp. 33–46, 6 fig., 1957. [15 ref. Received Dec. 1958.]

A detailed description of [tomato] stolbur virus [38, p. 74] in potato, tomato, egg-plant, sweet pepper (*Capsicum annuum*), and some weeds in Romania. Reference is made to Kovatchevsky's suggestion [cf. 35, pp. 388, 541] that the disease of potatoes considered to be caused by *Colletotrichum atramentarium* in recent years is in fact caused by the stolbur virus, and that the fungus only attacks plants already infected by stolbur.

MŠIGA (S.) & VALENTA (V.). **Prenos virusu stolburu prostrednictvom niektorých druhov Kukučín.** [Transmission of stolbur virus by some species of Dodder.]—*Biológia, Bratislava*, **12**, pp. 652–660, 4 fig., 1957. [Russian, German, and English summaries. Received Dec. 1958.]

Experiments by the Virology Section of the Czechoslovak Academy of Science with dodder (*Cuscuta* spp.) to transmit [tomato] stolbur virus [cf. 38, p. 135] from naturally infected and inoculated plants gave rather poor results. The virus was transmitted to some new host spp. in *Fabaceae* and *Apocynaceae*; it can also infect clover, which, with other leguminous forage crops, may prove a natural reservoir for it.

SINGH (G. P.). **Temperature studies of Barley stripe mosaic virus in certain cereal crops, and Tobacco mosaic virus in Pepper.**—*Diss. Abstr.*, **18**, 6, pp. 1956–1957, 1958.

At the University of Wisconsin none of the plants of 34 genera representing 12 families tested with barley stripe mosaic virus [cf. 37, p. 219] developed local lesions suitable for virus assay. In the susceptible hosts Oderbrucker barley, Henry wheat, and sweet corn symptoms were severe at 24° C. or above. The effect of soil temp. over the range 16–28° paralleled that of air temp., but was less marked. In the resistant barley accessions C.I. 5020, 3212, 3212–1, and 4219 symptom severity increased with air temp., and the plants were moderately susceptible at 24 and 28°. Seed transmission in the resistant vars. was greater at 20° or 24° than at 16°, and in general plants kept at 28° for 12 days and then grown at 16° showed higher seed transmission than those kept at 16° without change. In the field, resistant vars. were infected at all stages over a period of 60 days after planting, proving most susceptible when inoculated at the boot leaf stage: at 30 days seed transmission in them was 2–14%, compared with 55–71% in the susceptible Oderbrucker. While seed transmission in the resistant barley vars. was greater at the higher temp., it occurred over a wide temp. range in the susceptible plants.

Air temp. studies with the susceptible capsicum accessions P.I. 211909, 205169, and Californian Wonder, and the resistant Yolo Wonder and World Beater, indicated that air temp. should be considered in the genetic analysis of the resistance of capsicum to tobacco mosaic virus [34, p. 426]. In spring all susceptible

vars. developed apical necrosis at 24° or below, while at 28° blotchy mottle and prolonged chlorosis were observed. In winter California Wonder plants at 24 and 28° developed apical chlorosis and stem necrosis, and eventually collapsed. Yolo Wonder and World Beater at 16 and 20° developed chlorotic to necrotic spots on systemically infected leaves, while at 24 and 28° they were very susceptible, developing stem streak and apical necrosis before death.

In Yolo Wonder the virus conc. in inoculated, composite, and apical leaves was highest at high temp. Resistance to tobacco mosaic virus in capsicum is unrelated to the potency of the inhibitor of the virus in leaf extracts and probably qualitatively independent of air temp.

PANZER (J. D.). **The effect of pre-inoculation temperature on test plant susceptibility to Alfalfa and Tobacco mosaic viruses.**—*Phytopathology*, **48**, 10, pp. 550-552, 3 graphs, 1958.

At South Dakota State College, Brookings, 12-14 day-old plants of 4 vars. of bean (*Phaseolus vulgaris*) were sap inoculated with tobacco mosaic virus and 2 strains of lucerne mosaic virus [37, pp. 101, 416] after exposure to temps. in the range 5-50° C. (5° increments) for 2 hr. Lesion numbers in all cases were greatest after treatment at moderate temps. [cf. 36, p. 294], decreasing above 20-35° and much more markedly below 15°. Similar treatment of tobacco and *Nicotiana glutinosa* for 2 or 6 hr. before inoculation with tobacco mosaic virus had no such effect. Resistance induced by temp. was short lived, and treatment of bean at 10° was effective only if the plants were inoculated immediately afterwards. Thermal inactivation of lucerne mosaic virus in solution required 5 days at 5° and 15 min. at 35°. At both high and low temps. the condition of the plant is considered to be changed to render it less susceptible, but at high temps. thermal inactivation of the virus may also play a part.

KOZŁOWSKA (ANIELA). **Feststellung von organischen und anorganischen Salzen in gesunden und mit Virus X behafteten Tabakblättern mittels konduktometrischen Methode.** [Demonstration of organic and inorganic salts in healthy and virus X-infected Tobacco leaves by the conductometric method.]—*Acta microbiol. polon.*, **7**, 1, pp. 51-64, 8 graphs, 1958. [Polish summary.]

Studies at the Cracow Botanical Institute, Poland, demonstrated that in comparison with healthy tobacco plants the leaves of plants infected with [potato] virus X [37, p. 509] contained more free amino acids, which reached their peak conc. on the 7th day after inoculation. Of those present, aspartic acid was produced in greatest quantities during protein synthesis by the virus.

KAMIEŃSKA-ŻYŁA (K.). **Wykrywanie wirusa X w liściach Tytoniu metodą elektroforezy bibułowej.** [Determination of the virus X protein in Tobacco leaves by means of paper electrophoresis.]—*Acta microbiol. polon.*, **7**, 1, pp. 65-71, 1 fig., 2 diag., 2 graphs, 1958. [English summary.]

At the Cracow Institute of Virus Physiology the electrophorograms of sap of healthy tobacco leaves, after developing either with bromophenol blue or amide black, exhibited one band in the place of chlorophyll with absorbed protein, and a second band of protein substances shifted  $\pm 1$  cm. towards the anode. Corresponding electrophorograms from leaves infected with potato virus X showed 2 similar bands and a 3rd, probably formed by the virus protein, shifted about  $\pm 1$  cm. towards the cathode.

TOMLINSON (J. A.), SHEPHERD (R. J.), & WALKER (J. C.). **Purification and serology of Cucumber mosaic virus.**—*Nature, Lond.*, **182**, 4649, p. 1616, 1958.

At the Dept of Plant Pathology, University of Wisconsin, Madison, the dilution

end-point of partially purified preparations of cucumber mosaic virus from Havana tobacco, assayed on cowpea [cf. **32**, p. 164], ranged from  $10^{-3}$  to  $10^{-5}$  in 0.05 M potassium phosphate buffer. One preparation after 45 days at 3° C. had still retained about  $\frac{1}{2}$  its original infectivity, a longevity greater than that usually reported. Rabbit antiserum gave a positive precipitin reaction at dilutions up to 1/1024. Under the electron microscope numerous uniform spheres with a mean diam. of 40 m $\mu$  were seen in the virus preparations [**32**, p. 298].

THRESH (J. M.). **The spread of virus disease in Cacao.**—*Tech. Bull. W. Afr. Cocoa Res. Inst.* 5, 36 pp., 1 pl., 1 fig., 2 graphs, 1958. 2s. 6d. [70 ref.]

This valuable review summarizes information on the subject from sources which have been noticed from time to time [**38**, p. 75 *et passim*]. Though mainly concerned with cacao swollen shoot virus disease in W. Africa, it includes some account of its behaviour in Trinidad and suggestions are made for future work.

GRASSO (V.). **Rassegna delle specie di Claviceps e delle piante ospiti. (2° Contributo—1954–1957).** [A check-list of the species of *Claviceps* and of their host plants. (A second contribution—1954–1957).]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (1957), 2, pp. 317–334, 1958. [English summary. 115 ref.]

Further records [cf. **35**, p. 489] from 1954, and including part of 1957, of the hosts attacked by *C. spp.*, with their geographical distribution and a short list of records under the common name of the host in the original.

TYLER (V. E.). **Some factors influencing the saprophytic production of clavine alkaloids by *Claviceps purpurea*.**—*J. Amer. pharm. Ass.*, **47**, 11, pp. 787–792, 1958.

At the College of Pharmacy, Lincoln, Nebraska, the author confirmed the value of mannitol and ammonium succinate as superior C and N sources for the production of agroclavine, originally isolated by Abe from a strain of *C. purpurea* parasitic on *Agropyron semicostatum* in Japan (*J. agric. chem. Soc. Japan*, **22**, p. 2, 1948), by strains from the same host and from *Pennisetum typhoides*. Much heavier yields of alkaloid were obtained, however, with increased conc. of the 2 compounds, e.g., 15 or 20 instead of 10% mannitol and 10.8 or 21.6 g./l. ammonium succinate as compared with 2.7 or 5.4. Excellent results were also secured by the use of a carbohydrate-peptone medium (*J. Amer. pharm. Ass.*, **45**, p. 428, 1956), supplemented by 80 g. mannitol, 20 mg. indoleacetic acid, and 10 additional g. sucrose (total of 20 g.)/l. Submerged cultures contained considerably lower alkaloid conc. than stationary ones. In general, the cultures were allowed to develop for 35 days at room temp., but in some cases the period was extended to 45 days.

HEYNE (E. G.). **Registration of improved Wheat varieties, XXII.**—*Agron. J.*, **50**, 11, pp. 686–690, 1958.

Among these 11 additional wheat vars. [cf. **37**, p. 711] is Crockett (Reg. No. 363), a hard, red, winter wheat developed by Texas Agricultural Experiment Station and the Crops Research Division, which during 6 yr. trials excelled other early vars. in most comparative tests. It is strongly resistant to the prevalent races of leaf rust [*Puccinia triticina*: cf. **36**, p. 754], but susceptible to stem rust [*P. graminis*], wheat streak mosaic virus, soil-borne mosaic virus, and bunt [*Tilletia caries* and *T. foetida*: **37**, p. 767]; it is moderately resistant to loose smut [*Ustilago nuda*]. Minter (No. 365), a hard, red, winter wheat developed by the Minnesota and S. Dakota Agricultural Experiment Stations, has moderate resistance to stem rust, leaf rust, and bunt. Rushmore (No. 366), a hard, red, spring wheat from S. Dakota Agricultural Experiment Station, is resistant to many races of stem rust and has some tolerance of the 15 B complex. It appears to possess the Hope type (moderate)

resistance to leaf rust, loose smut, and bunt. The yield and test weight equal those of Thatcher, Rival, and Pilot.

Anderson (No. 369), a soft, red var., produced in the Uniform Southeastern Wheat Nursery by the Crops Research Division, has a high yield and moderate resistance to leaf rust, mildew [*Erysiphe graminis*], and lodging. Columbia (No. 370), a hard, red, winter wheat developed by Oregon Agricultural Experiment Station and the Crops Research Division, is expected to replace Rio and other Turkey vars. [37, p. 469]. It has usually outyielded Rio in the Columbia Basin. It resists all known races of common and dwarf bunt [*T. contraversa*]; it is more resistant to 'blasting' than Rio, but is susceptible to [unspecified] root rots under certain conditions.

Bison (No. 371) is a hard, red, winter wheat from Kansas Agricultural Experiment Station developed in co-operation with the Cereal Crops Division. It has a high yield, a good test weight, resistance to bunt, and tolerance of wheat streak mosaic. It is susceptible to loose smut, leaf rust, stem rust, and soil-borne mosaic virus. It is resistant to the prevalent races of bunt in Kansas. Inoculation tests with bunt spores over 8 years gave the following averages: Bison, 2% infected heads; Comanche, 2%; Pawnee, 17%; and Ponca, 69%.

The chief characteristics of Taylor 49 (No. 373), a soft, red var., distributed by N. Carolina Agricultural Experiment Station in the autumn of 1956, are resistance to soil-borne mosaic virus and moderate resistance to leaf rust. In 20 station trials in North Carolina during 1952-57, Taylor 49 averaged 39.2 bush./acre, as against 38.9, 37.6, 35.8, and 35.3 for Anderson, Taylor, Atlas 50, and Atlas 66, respectively.

**BASSETT (E. G.). Parasite growth and metabolic changes in Wheat during the development of stem rust.**—*Diss. Abstr.*, 18, 6, pp. 1953-1954, 1958.

In studies at the University of Wisconsin, aimed at developing a quantitative method for the determination of the growth of *Puccinia graminis* f. sp. *tritici* in wheat [cf. 36, p. 688], an attempt was made to relate the respiratory rate of the host/parasite complex to substrate accumulation by the host and to fungal growth on the susceptible var. Marquis. Wall chitin was selected as the most suitable index of the latter factor, its estimation being made by the action of a chitinase (from culture filtrates of *Myrothecium verrucaria*) and the determination of the breakdown product N-acetylglucosamine. It had previously been demonstrated with *Penicillium javanicum* that there was a constant ratio of 'apparent chitin' to dry wt. Estimated in this way chitin was demonstrable in germinated uredospores but not in non-germinated spores. Max. respiration occurred in inoculated leaves on the 10th day and reducing sugar content on the 11th. The 'apparent chitin' level on the 13th day was 25 times that on the 8th day.

**OMAR (A. A. M.). Inheritance of reaction to race 15 B and some other races of stem rust of Wheat.**—*Egypt. J. Bot.*, 1, 1, pp. 1-17, 1958. [Arabic summary.]

In these studies in 1952-3 [at the University of Minnesota] 24 crosses involving 12 spring wheat vars. were made. The field resistance to a collection of stem rust [*Puccinia graminis* f. sp. *tritici*: 37, p. 765] races appeared to be controlled by 2 complementary factors, R and S, which are present together in resistant vars. Their alleles are R, R<sup>1</sup> and r, S and s; moderate resistance is given by R<sup>1</sup>S; moderate susceptibility by Rs or Sr, and susceptibility by R<sup>1</sup>s or rs.

Seedling reaction in the F<sub>3</sub> to race 15 B at 80-85° F. indicated the action of 2 separate controlling factors T (T immunity, T<sup>1</sup> resistance, T<sup>2</sup> moderate resistance, and t susceptibility) and W (W moderate susceptibility, w susceptibility). T was epistatic to W; parental vars. were grouped in 5 classes, their reactions being summarized in a table: immune TW, resistant T<sup>1</sup>W, moderately resistant T<sup>2</sup>w, moderately susceptible tW, and susceptible tw.

BASILE (RITA), LEONORI-OSSICINI (AGNESE), & ZITELLI (GIUSEPPINA). **Specializzazione fisiologica di razze di ruggini dei cereali isolate da materiale raccolto durante la stagione 1956. *Puccinia graminis* var. *tritici* Erikss. et Henn.** [Physiologic specialization in races of cereal rusts isolated from material collected during the season of 1956. *P. graminis* var. *tritici*.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (1957), 2, pp. 195–200, 1958. [English summary.]

In 1956, a total of 154 isolates of *P. graminis tritici* [37, p. 529] was obtained by the authors in Italy, consisting of 50 different physiologic races, of which 18 were indigenous to Italy. Races 240 (R37), 241 (R38), 255 (R39), 291 (R40), 256 (R41), 242 (R42), 243 (R43), 244 (R44), 257 (R45), 292 (R46), and 258 (R47) were new isolations, recorded for the first time. Each of the following 4 races constituted over 5% of the total number of isolates identified: 21 (18.8%), 75 (14.9%), 34 (8.4%), and 107 (5.8%).

BASILE (RITA), LEONORI-OSSICINI (AGNESE), & ZITELLI (GIUSEPPINA). **Identificazione di razze fisiologiche di *Puccinia graminis* var. *tritici*, isolate da campioni di Frumento raccolto in Italia nel 1957.** [Identification of physiologic races of *P. graminis* var. *tritici* isolated from specimens of Wheat collected in Italy in 1957.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **15** (1957), 2, pp. 201–213, 1958. [English summary.]

In 1957 the authors obtained 124 isolates of *P. graminis tritici* from wheat in Italy, 25 physiologic races being identified. The 6 most frequently isolated were: 21 (30.64%), 75 (13.7%), 133 (12.09%), 186 (8.06%), 53 (7.25%), and 34 (6.45%), totalling 78.19% and confirming results obtained since 1953.

BASILE (RITA), LEONORI-OSSICINI (AGNESE), & ZITELLI (GIUSEPPINA). **Specializzazione fisiologica di razze di ruggini dei cereali isolate da materiale italiano raccolto durante l'annata 1956. *Puccinia recondita* Rob. ex Desm. (= *P. rubigo-vera* (DC.) Wint. f. sp. *tritici* (Erikss.) Carl.)** [Physiologic specialization in races of cereal rusts isolated from Italian material collected during the year 1956. *P. recondita* (= *P. rubigo-vera* f. sp. *tritici*).]—*Ann. Sper. agr., N.S.* **12**, 4, *Suppl.*, pp. IX–XIV, 1958. [English summary.]

In 1956, 72 isolates of *P. recondita* [*P. triticina*: cf. 37, p. 531] from wheat growing in 10 different localities in Italy (the majority in Lazio and Veneto) included 39 physiologic races, 12 of which (R24–R35) were indigenous and new records. Among the international races noted only 2 had an incidence of over 5% of the total, viz. races 1 (11.1%) and 159 (8.3%).

PRONICHEVA (Mme L. L.) & RASTEGAEVA (Mme E. M.). Биологические особенности бурой ржавчины Пшеницы в условиях Ростовской области. [Biological peculiarities of brown rust on Wheat under the conditions of the Rostov region.]—*Агробиология [Agrobiology, Moscow]*, 1958, 6, pp. 129–131, 1958.

At the Don Agricultural Research Institute, U.S.S.R., investigations were carried out on the occurrence of brown rust [*Puccinia triticina*: 37, p. 765] on wheat, which caused up to 95% infection in wet years. When wheat was sown on fields previously under sunflower, maize, or perennial grasses the incidence decreased markedly, and it was correlated with the type of irrigation employed. When winter wheat was sown 10–25 Sept. the incidence was also reduced. KCl solution applied as fertilizer before sowing the vars. Odeska and Voroshilovska decreased infection by 19%, and increased yield by 3.2 centner/ha. When P and K were used with 2,4-D, infection was decreased by 25% and yield increased by 19%. The rust was shown to be seed-borne.

GASKIN (T. A.). Developmental and genetic bases of resistance in Wheat to loose smut.—*Diss. Abstr.*, 18, 6, p. 1955, 1958.

In these studies at Purdue University [cf. 37, p. 404] 6 winter wheat vars. and selections were inoculated with *Ustilago tritici* [*U. nuda*]. In the resistant vars. there were differences in the time at which resistance, as shown by a decline in the percentage of invaded tissues and organs, found its expression. In Hope-Hussar the pericarp and endosperm were invaded, but not the embryo, whereas Kawvale and Tremezino had high percentages of invaded embryos [cf. 37, p. 653], though from the 2-4 week stage the fungus failed to maintain itself at the growing point and the heads were free from smut.

In Tremezino there was a limiting effect of the maternal tissue upon the invasion of the seed, as demonstrated by reciprocal crosses. Rietti exhibited a similar effect, but differed in that further expression of resistance began earlier (before the 2-week stage) and was not complete. P.I. 191533, at first completely susceptible, became resistant between the 2- and 4-week stages.

Resistance of the embryo exclusion type found in Hope-Hussar is derived from Yaroslav emmer: this reaction was effective against only 4 of the 14 races tested, and did not depend on any detectable chemical substance. Dwarfing, apparently induced by excessive fungal invasion, was observed. In reciprocal crosses between the 5 resistant vars. and Knox, Tremezino, and Rietti as female parents induced a lowering of smut in the  $F_1$ , indicating a resistance effect of the maternal tissue. Resistance was recessive in all the crosses: in Hope-Hussar and P.I. 191533 there was one factor pair for resistance; in Kawvale, Tremezino, and Rietti there were 2 pairs. Crosses of Tremezino and Rietti with P.I. 191533 indicated that resistance in the last-mentioned was not the same as in the first 2.

КАЧАЛОВА (Мме Z. P.). Влияние бактеризации семян на повышение устойчивости Пшеницы и Овса к болезням. [The effect of seed bacterization on the increase in resistance of Wheat and Oats to diseases.]—*Proc. Timiryazev agric. Acad.*, 31, pp. 103-109, 1957. [Received 1959.]

Treatments in 1954-56, in the Moscow and Kostromsky regions, of seed of the spring wheats *Lutescens* 62, Moscowka, and Tsezium III with a combination of vernalization, granosan 2, and azotobacterin or phosphorobacterin reduced fusariosis [*Fusarium* sp.: 37, p. 345] to 0.2-0.5% and bunt [*Tilletia caries*: 37, p. 765] to 0.1-0.3% (control 1.3% *Fusarium* infection and 42.5% bunt) and increased yield from 109.1% to 173.6%. Yields of the oat vars. Dippe and Lokhovski were increased by 8.7-19% by the same treatment.

РАСТЕГАЕВА (Мме Е. М.). Корневая гниль Пшеницы и некоторые приемы борьбы с ней. [Root rot in Wheat and some measures for its control.]—*Агробиология [Agrobiologia, Moscow]*, 1958, 6, p. 131, 1958.

In the Aksaysky district, Rostov region, Donskaya garnovka wheat seed was exposed to the sun to control root rot, a complex infection with *Helminthosporium* sp. [cf. 37, p. 655] predominant. The treatment was carried out from 21 Aug.-2 Sept., with an air temp. of 50° [C.], the grain being wetted with 10-30% water. In the 1st 3 days the temp. of the grain in the bottom layers varied from 28-30° and the ambient air temp. was 24-33°, compared with 26-36° in dry grain. After 3 days a uniform temp. was obtained throughout the grain. This treatment decreased root rot by 50%, and in similarly heated dry grain by 30%. Exposure of the grain to stronger sun heat in July and Aug. had an even better effect and considerably reduced the incidence of loose smut [*Ustilago nuda*: 37, p. 331; cf. p. 469].

ГОМОЛЯКО (М. I.). Вплив на ріст ярої Пшениці грибів з її ризосфери. [The effect of the fungi in the rhizosphere of spring Wheat on its size. 3rd

Report.]—Мікробіол. Журн. [*J. Microbiol., Kiev*], **20**, 3, pp. 3–9, 1958.  
[Russian summary.]

At the Microbiological Institute, Kiev, fungi of the genera *Cladosporium*, *Stemphylium*, *Torula*, *Mucor*, *Tieghemella*, *Penicillium*, and *Aspergillus* were isolated from the rhizospheres and roots of wheat [cf. **37**, p. 655] and grown separately in plots of calcined sand with peat and P fertilizer. After 1–3 months the spring wheat *Lutescens* 062 was sown. The fungi stimulated growth, the best results being obtained with *Cladosporium* sp. It was shown that the fungi in decomposing proteins form volatile substances rich in N and do not assist the oxidation of ammonia and the deoxidation of nitric acid. The beneficial effect of the fungi in the field is noticed only when organic fertilizers, P in assimilable form, and peat are present in the soil.

LAMBERT (J. W.). **Registration of Barley varieties, XIV.**—*Agron. J.*, **50**, 11, pp. 708–711, 1958. [18 ref.]

Bonneville barley (Reg. No. 26), developed at Utah Agricultural Experiment Station in co-operation with the U.S. Dept of Agriculture, is resistant to some races of mildew [*Erysiphe graminis*: **36**, p. 716] and to loose and covered smut [*Ustilago nuda* and *U. hordei*], but susceptible to rusts [*Puccinia* spp.] and to most other barley diseases not found in the inter-mountain region. It is best adapted to the heavier soils of the irrigated areas of Utah, Idaho, Oregon, and Washington, and is grown extensively in this region. Hiland (No. 27), from Wyoming Agricultural Experiment Station, is resistant to mildew and loose smut. Rogers (No. 28), from Oklahoma Agricultural Station in co-operation with U.S. Dept of Agriculture, is resistant to mildew and to some races of loose smut.

From the Missouri Agricultural Experiment Station, Mo. B-475 (No. 30) is resistant to loose smut and to certain races of *U. nigra* [**36**, p. 670]. In 30 tests in Missouri during 1948–56 it had an av. of 2 heads/10 ft. row naturally infected by *U. nuda*, as against 0.5 for Mo. B-400, 36 for Remo, and 5 for Missouri Early Beardless.

Colonial 2 (No. 35) from N. Carolina Agricultural Experiment Station is resistant to certain mildew races and tolerant of moderate infection by leaf rust [*P. hordei*]. In 1957 it was sown over about 70% of the barley acreage of N. Carolina. A selection made at the N. Dakota Agricultural Experiment Station, Traill (Reg. No. 39), is resistant to stem rust, but susceptible to spot blotch [*Cochliobolus sativus*], net blotch [*Pyrenophora teres*], and *Septoria* leaf blotch [*S. passerinii*: cf. **36**, p. 463]. Traill is becoming increasingly important, being cultivated over a large part of the acreage formerly sown with Kindred in N. and S. Dakota and Minnesota. Feebar (Reg. No. 41) [loc. cit.] from S. Dakota Experiment Station is resistant to stem rust and *S. passerinii*, but susceptible to loose smut, leaf rust, spot blotch, and bacterial blight [*Xanthomonas translucens*: cf. **36**, p. 394].

SINGH (S.). **Physiology and epidemiology of *Helminthosporium teres*.**—*Diss. Abstr.*, **18**, 6, pp. 1951–1952, 1958.

Although *H. [Pyrenophora] teres* overwinters in barley grain the principal source of initial infection in these studies at the University of Minnesota was plant debris. Inoculated grain did not give rise to infected seedlings when sown at 18, 24, and 29° C. Barley plants were infected over a wide temp. range (10–33°), and most severely from 15–25°, but depending to some extent on the race of the fungus. The opt. moist period for infection ranged from 10–30 or more hr., according to race, and the presence of free moisture was important both at inoculation and during the

establishment of the pathogen. Barley vars. with a greater tendency to become water-soaked usually proved more susceptible, and susceptibility also increased with the age of the plants. High N and high P predisposed to infection. Anionic and non-ionic wetters increased the percentage of infection by ensuring even distribution of the inoculum and facilitating penetration: polyethylene glycol 400 (monolaurate) was the most effective. Both types of wetter retarded spore germination and fungal growth, so that their action in promoting infection was on the host. Distinct cultural and parasitic races were demonstrated, differing in rate of growth, sporulation, and opt. temp. for growth and infection. In all, 22 spp. of 11 genera of the Gramineae were infected. Growing resistant barley vars. [38, p. 78] would appear the most practical method of control.

MURPHY (H. C.). **Registration of Oat varieties, XXI.**—*Agron. J.*, 50, 11, pp. 701–707, 1958. [49 ref.]

Among oat vars. recently registered under a co-operative agreement between the Crops Research Division and the American Society of Agronomy, Indio (Reg. No. 138), from California Experiment Station, Davis, has the Richland type (A gene) of resistance to stem rust [*Puccinia graminis*] but is susceptible to barley yellow dwarf [virus: cf. 35, p. 670; 36, p. 754]. When exposed to stem rust epiphytotics in 1953, it yielded 73% more than Palestine (No. 139), received from Melbourne, Australia, in 1926, which had the highest av. yield of all oat vars. in over 300 tests from 1940–1956 in California. Minhafer (No. 143), from Minnesota Agricultural Experiment Station, St. Paul, is the 1st var. to possess combined resistance to all the prevalent races of crown rust [*Puccinia coronata*: cf. 36, p. 582], to all known races of stem rust, and to loose and covered smut [*Ustilago avenae* and *U. hordei*] at the time of its release to growers. Unfortunately, race 13A [38, p. 79] of stem rust, to which Minhafer is susceptible, was collected and identified for the first time in N. America in 1957, the year in which Minhafer was distributed. Minhafer has the ABC genes for stem rust resistance and the Landhafter (L) gene for crown rust resistance. It is susceptible to the uncommon races 264, 276, 290 [37, p. 406], and other Landhafter-attacking races of crown rust. It is significantly superior in yield to Andrew (No. 113).

The chief characteristics of Minland (No. 144), also from Minnesota, are its combined resistance to all races of stem rust except 7A and 13A, to all races of crown rust except the Landhafter-attacking races already mentioned, and to all races of loose and covered smut. The acreage sown, however, is largely being replaced by Minhafer. Bentonland (No. 147), from the Purdue University Agricultural Experiment Station, Lafayette, Indiana, appears to be almost identical with Benton, except that it has the L gene for resistance to crown rust, and because of this resistance should largely replace Benton.

Clintonland (No. 148), also developed at Purdue with the U.S. Dept of Agriculture, appears to be almost identical with Clinton 59, except that it possesses the L gene, has the D gene for resistance to races 1, 2, 5, 8, 8A, 9, 10, and 11 of stem rust, and is highly resistant to most races of loose and covered smut.

Putnam (No. 152), from the same source, has shown its greatest yield advantages in southern Indiana, where it has excelled all other vars. over a period of 4 yr. Its early maturity sometimes allows it to escape heavy damage from crown and stem rust. It has the D gene for stem rust resistance. It is resistant also to the '290 group' of Landhafter-attacking races of crown rust, but is susceptible to the '264 group', as well as to most of the common races. It is susceptible to barley yellow dwarf virus and moderately so to *Septoria* [*Leptosphaeria avenaria*: 36, p. 20]. It has been highly resistant to loose and covered smut throughout the North Central Region, and C. S. Holton (unpublished data) ascertained that it was highly resistant to all races of loose and covered smut except A-15.

Mid-South (Sel. HVR-41; No. 150), distributed by the Mississippi Station in 1957, was a selection from seedlings resistant to Victoria blight (*Helminthosporium victoriae*) obtained from Victorgrain 48-93, and is nearly identical with it, except that the former is resistant to Victoria blight and has better winter survival. It is less resistant, however, to certain races of crown rust (202, 203, etc.).

Developed at Coker's Pedigreed Seed Company, Hartsville, S. Carolina, Suregrain (No. 153) may contain a few plants susceptible to crown rust, but it is resistant to Victoria blight, to all races of smut, and to most of the 'Victoria-attacking' races of crown rust. It is susceptible to stem rust and moderately so to soil-borne mosaic [virus].

Dupree (No. 154), from Kansas Agricultural Experiment Station, Manhattan, in co-operation with the U.S. Dept of Agriculture, possesses the D gene for resistance to the older Bond-attacking races of crown rust, is resistant to Victoria blight, and only moderately susceptible to *L. avenaria*. It has been immune from or highly resistant to all races of loose and covered smut.

Originated at the S. Dakota Experiment Station, Brookings, James (No. 155) has the D gene for stem rust resistance, Bond resistance to crown rust, and resistance to all races of loose and covered smut.

Waubay (No. 156), from the Branch Experiment Station, Aberdeen, Idaho, has the A gene for resistance to races 1, 2, 3, 5, 7, and 7A of stem rust, and is moderately resistant to the older races of crown rust. C. S. Holton (unpublished data) found it to be resistant or moderately resistant to all races of loose and covered smut. It has usually been moderately susceptible to *L. avenaria*, halo blight [*Pseudomonas coronafaciens*], and barley yellow dwarf virus. Its yield in S. Dakota has been similar to that of Marion; it is recommended for the eastern part of the State. Jackson (No. 159) has the same stem-rust, crown-rust, and smut resistance as Waubay, which it resembles in its other disease reactions.

Ferguson 560 (No. 158), from Arkansas Agricultural Experiment Station, Fayetteville, is recommended in the 2 southern tiers of counties where the rust hazards necessitate a typical Red Rustproof var. Park (No. 160), from Aberdeen, Idaho, has the A gene for stem rust resistance and the Victoria type of resistance to most races of crown rust. It is susceptible to Victoria blight and to race 216 and other Victoria-attacking races of crown rust. In 24 irrigated tests in 1947-52 Park yielded 13 bush./acre more than Mission; it out-yielded other recommended vars. at both irrigated and non-irrigated stations in Idaho over a period of 7 yr. Bonham (No. 161), from the Upper Peninsula Experiment Station, Chatham, Michigan, has the D gene for stem rust resistance and displays considerable tolerance of or field resistance to halo blight, though susceptible to *L. avenaria*.

VIRTANEN (A. I.). **Antimikrobiell wirksame Substanzen in Kulturpflanzen.** [Antimicrobial substances in cultivated plants.]—*Angew. Chem.*, **70**, 17-18, pp. 544-552, 4 fig., 6 graphs, 1958.

From the Biochemisches Institut, Helsinki, Finland, it is reported that benzoxazolinone (BOA) [35, p. 821; 38, p. 58], not present in rye grain, is first synthesized in small quantities during germination in the dark, and reaches a high concentration (max. 0.1% fresh wt. in the vars. examined) only after the onset of photosynthesis. Inoculation of young green plants with a hyphal suspension of *Fusarium nivale* [*Calonectria nivalis*] gave rise to no infection, while plants raised in the dark were killed in 1-2 weeks. With the coming of autumn frosts the BOA content fell to about  $\frac{1}{10}$ , but the fall in antifungal activity of the tissues was not comparable, as the breakdown products of BOA, at present under study, themselves exhibit antifungal activity. The progress of the author's studies on antifungal substances in some other plants [cf. 37, p. 210] is summarized.

Also obtainable from the

# COMMONWEALTH MYCOLOGICAL INSTITUTE

## INDEX OF FUNGI

(formerly SUPPLEMENTS TO THE REVIEW OF APPLIED MYCOLOGY)

Published twice yearly. Subscription 10s. per annum. Vol. 1, 1940-49, bound complete with Index, price £6. 5s.; Vol. 1, parts 1 to 20, and Vol. 2, parts 1 to 17, 5s. each. Vol. 1 Index and Title-page, 25s.

PETRAK'S LISTS of new species of fungi reprinted from Just's *Botanischer Jahresbericht* for 1920-39 with INDEX PARTS 1 and 2 now available. Prices on application.

## BIBLIOGRAPHY OF SYSTEMATIC MYCOLOGY

Issued annually. Bibliography of systematic mycology (1957). Price 7s. 6d. Previous issues (1947-56), 8 parts, 22s. 6d. complete.

## MYCOLOGICAL PAPERS

No. 65. SOME SPECIES OF CORYNESPORA. By M. B. ELLIS. 15 pp., 8 fig., 1957. 6s.

No. 66. SOME SPECIES OF DEIGHTONIELLA. By M. B. ELLIS. 12 pp., 6 fig., 1957. 5s.

No. 67. HAPLOBASIDION, LACELLINOPSIS, AND LASCELLINA. By M. B. ELLIS. 15 pp., 9 fig., 1957. 6s.

No. 68. STUDIES OF PYRENOMYCETES: I. FOUR SPECIES OF CHAETOSPHAERIA, TWO WITH CATENULARIA CONIDIA. II. MELANOPSAMMA POMIFORMIS AND ITS STACHYBOTRYS CONIDIA. By C. BOOTH. 27 pp., 7 fig., 1957. 9s.

No. 69. SOME SPECIES OF TERATOSPERMA. By M. B. ELLIS. 7 pp., 5 fig., 1957. 3s.

No. 70. CLASTEROSPORIUM AND SOME ALLIED DEMATIACEAE—PHRAGMOSPORAE. I. By M. ELLIS. 89 pp., 63 fig., 1958. 30s.

Issued at irregular intervals. Until further notice a rebate of 33½ per cent. is allowed on new Papers to those who register for all numbers as issued, the charge to subscribers to the *Review of Applied Mycology* being added to their subscriptions for the succeeding year, others being billed annually. Binding-case for Mycological Papers 1-25, price 5s. 6d.

---

A DICTIONARY OF THE FUNGI. By G. C. AINSWORTH and G. R. BISBY. Fourth edition, 475 pp., 10 pl., 20s., post free.

AN INTRODUCTION TO THE TAXONOMY AND NOMENCLATURE OF FUNGI. By G. R. BISBY. Second edition, 143 pp., 10s., post free.

THE BRITISH SMUT FUNGI. By G. C. AINSWORTH and K. SAMPSON. 137 pp., 21 fig., 1950. 20s.

USTILAGINALES OF INDIA. By B. B. MUNDKUR and M. J. THIRUMALACHAR. 84 pp., 148 fig., 1952. 20s.

THE GENUS PHYTOPHTHORA. DIAGNOSES (OR DESCRIPTIONS) AND FIGURES FROM THE ORIGINAL PAPERS. By GRACE M. WATERHOUSE. 120 pp., illus., 1956. 15s.

---

## THE REVIEW OF APPLIED MYCOLOGY

The subscription to the *Review* for the current volume is 70s. per annum, post free, payable in advance.

Back volumes can be supplied at 80s. per volume, postage extra, with the exception of a few parts, which are out of print. Microfilm copies of the volumes out of print can be supplied to order. Foreign subscribers should pay by International Money Order or through the British Agents of their Bankers.

Orders and correspondence should be addressed to the DIRECTOR, COMMONWEALTH MYCOLOGICAL INSTITUTE, FERRY LANE, KEW, SURREY.

The Executive Council of the Commonwealth Agricultural Bureau is a signatory to the Fair Copying Declaration, details of which can be obtained from the Royal Society, Burlington House, London, W.1.

© Commonwealth Agricultural Bureaux, 1959.

# CONTENTS

## AUTHORS' NAMES

- Abdel-Hak, 196  
Abrahão, 206  
Addy, 237  
Aerts, 223  
Agnihotri, 220  
Akai, 204  
Alexander, 241  
Allen, 195  
Altman, 245  
Ark, 208, 219  
Asakawa, 244  
Atkins, 195  
Atkinson, 195  
Aura, 220  
Bagchee, 230  
Banerjee, 247  
Baruah, 224  
Basile, 196, 252  
Bassett, 251  
Beauduin, 223  
Bennett, 215  
Bernardo, 210  
Billbruck, 229  
Blackwood, 239  
Bock, 206  
Boewe, 201  
Bolay, 214, 237  
Bovey, 218  
Boyer, 230  
Brown, 236  
Bucur, 233  
Campbell, 200  
Carangal, 210  
Chamberlain, 206  
Changsi, 211  
Chapman, 201  
Chilton, 225  
Chinn, 200  
Chowdhury, 224  
Christensen, 203  
Ciferri, 240  
Cochran, 216  
Cormack, 213  
Cramer, 206  
Crosse, 215, 218  
Daniels, 234  
Dark, 207  
Das-Gupta, 219  
Davidson, 229  
Davies, 224  
Deep, 217  
Delmas, 217  
De Lint, 222, 224  
De Tempe, 209  
Detilleux, 220  
Dewey, 198  
Dickens, 199  
Dikshit, 206  
Dobrescu, 214  
Docea, 214  
Domasheva, 246  
Downey, 213  
Easton, 222  
Efimova, 212  
Ellingboe, 213  
El-Seify, 196  
Endo, 201  
Ezuka, 225  
Falkenstein, 243  
Farrar, 193, 201, 205  
Fichera, 243  
Forbes, 225  
Forsyth, 194  
Frankovskii, 215  
Frazier, 217  
Fukunaga, 244  
Fukutomi, 204  
Fults, 234  
Futrell, 195  
Garber, 227  
Garrett (C. M. E.), 215  
Garrett (W. N.), 195  
Gaskill, 234  
Gaskin, 253  
Gersonde, 232  
Gertsch, 193  
Gibson, 232  
Gilmer, 217  
Glasscock, 229  
Goheen, 237  
Golenia, 200, 220  
Golubintseva, 233  
Gomolyako, 253  
Graham, 210  
Grasso, 250  
Gray, 222  
Green (G. J.), 196, 201  
Green (R. J.), 219  
Gröger, 202  
Grosclaude, 217  
Gustavsson, 201  
Harhash, 228  
Hart, 226  
Heggestad, 227  
Henneberry, 211  
Hewitt, 237  
Heyn, 208  
Heyne, 250  
Higgins, 242  
Hirata, 244  
Hirayama, 204  
Hirth, 226  
Hodgson, 223  
Holmes, 236  
Hougas, 222  
Hoymann, 221  
Hull, 234  
Imle, 193  
Isaac, 247  
Jackson, 231  
Jensen, 198  
Jerome, 245  
Johnson, 196  
Johnston (A.), 240  
Johnston (C. O.), 197  
Johnston (G. R.), 224  
Joshi, 220  
Kaarep, 239  
Kachalova, 253  
Kamińska-Zyla, 249  
Kazadaev, 231  
Keller, 226  
Kemp, 211  
Khalabuda, 200  
Kharadzhe, 219  
Khudyakov, 200  
Kim, 235  
Kitajima, 215  
Kojima, 244  
Kole, 240  
Konger, 224  
Kozhevnikov, 193  
Kozłowska (A.), 249  
Kozłowska (C.), 232  
Kuehner, 243  
Kuntz, 229  
Kuvshinova, 247  
Lambert, 254  
Larson, 222  
Lawrence, 224  
Leasure, 243  
Ledingham, 239  
Lefflot, 237  
Leonori-Ossicini, 252  
Licciardello, 243  
Limasset, 247  
Lister, 234  
Logan, 207  
Long, 205  
Louvet, 233  
Lovisolo, 214  
Luig, 197  
Luke, 201  
Lyu, 205  
Manigault, 240  
Maramorosch, 202  
Marchenko, 220  
Matishevskaya, 228  
McCullom, 229  
Meyers, 222  
Michel, 201  
Misot, 244  
Mishustin, 233  
Mišiga, 248  
Mohamed, 196  
Morales, 199  
Morochkovskii, 243  
Mostafa, 228  
Muller, 245  
Munnecke, 241  
Murphy, 255  
Muskett, 209  
Naito, 244  
Nalivaiko, 211  
Naumova, 233  
Nelson, 210  
Nikiforova, 226  
Nonaka, 204  
Novák, 210  
Omar, 251  
Orjuela-Navarrete, 195  
Panzer, 249  
Paoli, 240  
Parker, 231  
Partyka, 223  
Pawelczyk, 200  
Payne, 234  
Peake, 213  
Pearson, 218  
Person, 194  
Petrukovich, 246  
Peterson, 196  
Pfeiler, 201  
Phillips, 238  
Pillpenko, 227  
Pine, 216  
Pitcher, 218  
Polushkina, 230  
Pop, 216  
Popow, 194  
Pordesimo, 204  
Porrey, 223  
Posnette, 217  
Pospelov, 246  
Proncheva, 252  
Purdy, 193  
Qasem, 203  
Raabe, 211  
Rabinovich, 210  
Ragimov, 237  
Rangaswami, 247  
Raski, 237  
Rastegaeva, 252, 253  
Rataj, 209  
Razvyazinka, 227  
Redmond, 228  
Reinhart, 215  
Reyes, 205  
Richardson, 221  
Riegert, 240  
Riker, 229  
Roane, 193  
Roberts, 205  
Robinson, 206  
Rohringer, 228  
Roland, 248  
Romanko, 202  
Rosser, 229  
Roy, 243  
Russell, 200  
Saad, 243  
Samborski, 194, 196  
Santiago, 196  
Sarkar, 247  
Saunders, 207  
Savulescu, 248  
Schmiedeknecht, 246  
Schultz (E. S.), 221  
Schultz (G.), 235  
Sen, 219  
Serrano, 203  
Shemakanova, 230  
Shepherd, 249  
Shifman, 198  
Shklyar, 209  
Shneider, 216  
Shrum, 193  
Simons, 201  
Singh (G. P.), 248  
Singh (S.), 254  
Slavénas, 242  
Smale, 241  
Smith, 229  
Sommereyns, 247  
Speichert, 200  
Sprague, 215  
Stacy, 193  
Staehelin, 214, 237  
Stahmann, 228  
Startling, 193  
Steib, 225  
Steudel, 234  
Stewart, 205  
Stoll, 240  
Strobe, 210  
Struckmeyer, 229  
Sulachana, 208  
Suryanarayanan, 203, 244  
Tehong, 240  
Thresh, 250  
Tiffelli, 227  
Tiffin, 236  
Tishchenko, 224  
Tomlinson, 249  
Travis, 211  
Trione, 231  
Tucay, 210  
Tyler (L. J.), 198  
Tyler (V. E.), 250  
Tymchenko, 212  
Udagawa, 204  
Valásková, 212  
Valenta, 248  
Van Andel, 242  
Van Assche, 236  
Van Der Vliet, 237  
Van Katwijk, 216  
Yanky, 233  
Veenenbos, 197  
Venning, 193  
Virtanen, 256  
Vovk, 236  
Voznyakovskaya, 200  
Vuittenez, 237  
Wagner, 223  
Walker, 228, 249  
Wallace, 201  
Wang, 225  
Watson, 197  
Way, 217  
Webb, 221  
Weber, 211  
Wickens, 207  
Wilhelm, 210, 211  
Wilson, 219  
Yakovleva, 203  
Yoshi, 204  
Zakopal, 238  
Zaprometov, 246  
Zitelli, 252  
Zogg, 194  
Zuckerman, 217

## SUBJECT INDEX

- Airborne fungi, 243  
Antibiotics, 223, 244-5  
Bacteria, 240, 246  
Books, 240  
Diseases and disorders of:  
  Apple, 213, 214, 215  
  Banana, 218  
  Cacao, 193, 250  
  Cereals, 193-203, 205, 212, 250-6  
  Citrus, 205-6  
  Coffee, 206  
  Cotton, 207-8  
  Fibre plants, 209-10  
  Flowers and ornamentals, 210-12  
  Fruit, 213-19, 239  
  Herbage crops, 212-13  
  Mushrooms, 237  
  Official plants, 219-20  
  Potato, 220-5, 238  
  Rice, 203-4  
  Sugar beet, 234-5  
  Sugar-cane, 225  
  Tea, 225  
  Tobacco, 226-7  
  Tomato, 227-8, 246  
  Trees and timber, 228-32  
  Vegetables, 233-7  
  Vine, 237  
Fungicides, 211, 212, 232, 239, 240-2  
General publications, 239, 243  
Genetics, 247  
Hormones, 244  
Lists of fungi and diseases, 246, 250  
Physiology, 246, 250  
Plant quarantine, 193  
Reports from Estonia, 239; Jersey, 238; Netherlands, 213  
Soils and fertilizers, 232  
Technique, 225, 243, 247  
Virus diseases, 217-18, 220-2, 226, 227, 234-5, 236, 239, 247-50  
Yeasts, 243